WHY YOUR CAR NEEDS A TIGER

* ELIMINATES TUNE–UPS AND POINTS REPLACEMENT
* STARTS INSTANTLY IN ANY WEATHER––HOT OR COLD
* SHARPLY REDUCES ENGINE MAINTENANCE EXPENSE
* INCREASES GAS MILEAGE AND HORSEPOWER UP TO 15%
* IMPROVES ACCELERATION AND OVERALL PERFORMANCE
* INCREASES SPARK PLUG LIFE TO 50,000 MILES
* OPERATES WITH A DUAL IGNITION CONTROL SWITCH
* CURTAILS EMISSION OF EXHAUST POLLUTANTS
* AMPLIFIES SPARK PLUG VOLTAGE TO 45,000 VOLTS
* MAINTAINS HIGH SPARK PLUG VOLTAGE TO 10,000 RPM

THE TIGER, THE MOST POWERFUL, EFFICIENT AND RELIABLE ELECTRONIC IGNITION MADE, CAN BE INSTALLED IN 30 MINUTES ON ANY VEHICLE WITH A 12-VOLT NEGATIVE GROUND SYSTEM. THIS INCLUDES MOST OF THE VEHICLES ALREADY EQUIPPED WITH ELECTRONIC POINTLESS IGNITION.

TIGERS can be installed on cars in California because they are exempt from prohibitions of Section 27156 of the California Air Resources Board pursuant to Executive Orders D-20-1 and 2.

GUARANTEE

Tri-Star Corporation warrants to the original purchaser, the TIGER capacitive discharge ignition to be free from defects in material, workmanship and operation for the life of the vehicle on which it is originally installed.

Any unit which shall operate improperly will be repaired or replaced by Tri-Star Corporation if returned to Tri-Star Corporation, P. O. Box 1727, Grand Junction, Colorado 81501, accompanied by the customer portion of the warranty registration card. The return should be accompanied by a $1.00 service charge to defray postage and handling if the unit is more than 1 year old.

Tri-Star Corporation's liability shall be to repair or replace any material or unit found inoperable and returned by the original owner. This guarantee does not apply to units which have been damaged by misuse, abuse, modification, alteration or improper installation.

This guarantee is the sole applicable guarantee and cannot be modified by any other agent except by written authorization of an officer of Tri-Star Corporation.

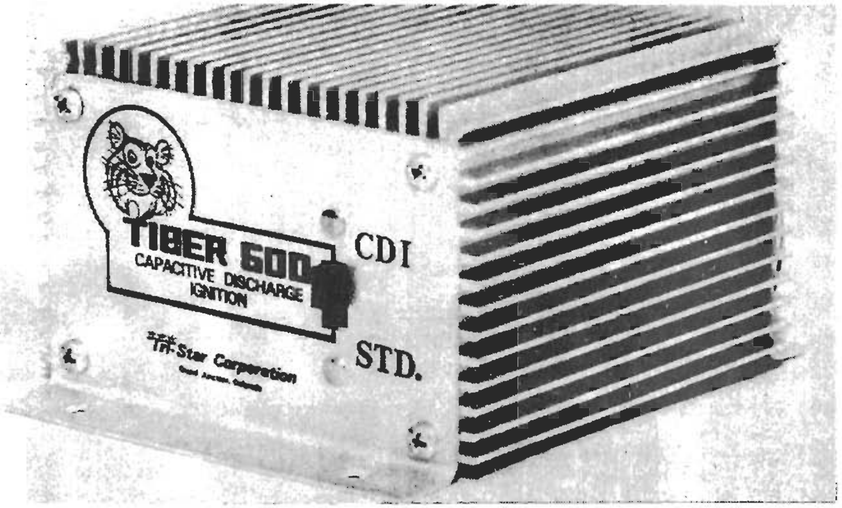
Tri-Star Corporation

P.O. Box 122 Station F R2L 2A5 Ph. 667-8810

A REVOLUTION IN IGNITION SYSTEMS

FOR CARS WITH PRE 1980 IGNITION SYSTEMS —USING POINTS ONLY

TRI-STAR TIGER SALES OF CANADA
P.O. Box 122, Station F, Winnipeg, Manitoba R2L 2A5
Telephone (204) 667-8810



TIGER 500 C D TECHNICAL DATA

Input Voltage:	12 Volt nominal negative ground system with either generator or alternator.
Triggering Source:	Breaker or breakerless points or any other suitable source.
Input Amperage:	.6 to 8 amperes depending on RPM; 2.5 amperes at 2,000 RPM.
Output Pulse:	.3 microseconds rise to peak to coil primary.
Available Power:	.15 joule per pulse.
Spark Duration:	300 microseconds.
Minimum Firing Voltage:	5.5 Volts
Available Output Voltage:	Cranking - 8v, input 30,000 Volts, 500 RPM - 12v, input 45,000 Volts. 7,500 RPM - 12v, input 40,000 Volts.
Peak Spark Current:	.175 Amp
Peak Power Ratio:	.91

Switch is two position with gold-plated contacts.

Size: 4¼" x 4¼" x 2¾" – 2 pounds

TIGER 500 has fuse circuit to protect TIGER components and auto ignition wiring from extraordinary and unusual power surges.

ASSEMBLED – READY TO INSTALL

Unit warranted free of defects in material, workmanship and operation for the life of the vehicle on which it is originally installed.

STANDARD IGNITION

Universal Domination For 65 Years

"Breaker points ignition systems are going the way of the whalebone corsets, nickel cigars and the iceman. Born 65 years ago in the famed ignition system that Charles F. Kettering designed for early Cadillacs, breaker points have stubbornly resisted retirement," until the past few years. In that fashion, Rudolf Graf, one of the foremost authors on both electronics and automotive electronics, describes the Kettering system that dominated the automotive field for more than half a century and only recently began to loosen its grip.

Charles Franklin Kettering first designed his ignition system in 1908. With minor modifications, the system was exclusively used on American-made automobiles until 1973 and is referred to as the conventional ignition system.

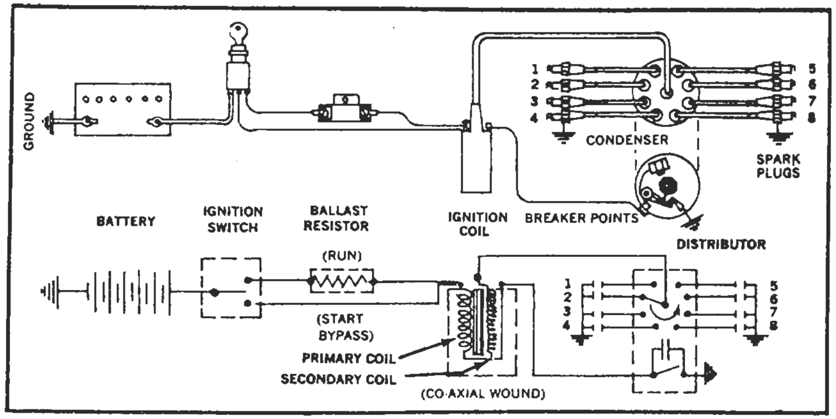
Principal components of the Kettering ignition system are the battery, ignition switch, coil, spark plugs, high tension wiring and the distributor, with its main components of the points, condenser, rotor, cam and cap. Unifying purpose of the entire system is to provide the spark that ignites a compressed air-fuel mixture in the compression chambers. The ignition runs the engine, producing the power. The spark that causes ignition or explosion must occur at the precise instant that the piston nears top dead center on the compression stroke. On an eight-cylinder engine traveling at a speed of 60 miles per hour or 2,400 revolutions per minute, a spark occurs 9,600 times per minute.

The battery provides a source of low voltage to the coil which transforms 12 volts into 15,000. Between the battery and the coil are the ignition switch or master control of the system and a ballast resistor. The coil, a relatively small cylindrical unit, consists of a soft iron core around which is wrapped thousands of turns of fine metal wire called the secondary wiring. Around the secondary wiring is the primary wiring, a few hundred turns of thicker wire.

The coil primary is connected to the points in the distributor. When the points close, current flows into the coil primary and a magnetic field builds up. When the points open, the magnetic field collapses inducing a high voltage surge in the coil secondary. The surge, usually about 15,000 volts, goes through a high tension wire to the appropriately named distributor, which passes the charge onto each spark plug. Rise time, a critical factor in efficient engine performance, is the number of microseconds it takes the coil to build up voltage.

The distributor is a fast-acting switch, distributor of high voltage and coordinator of a sequence that takes place some 100,000,000 times across 10,000 miles before tune-up maintenance and parts replacement normally take place. The lower portion of the distributor, which performs the switching function, consists of a gear-like wheel called a cam lobe, points and condenser. The cam has a lobe for each cylinder of the engine and as it spins around on the distributor shaft, opens and closes the points. The points consist of two arms with tungsten tips. One is stationary and the other is spring-loaded and has a small plastic piece on it called a rubbing block which comes in contact with the cam lobe causing the points to open and close. Dwell, though often expressed in degrees, is the percentage of time of the cycle that the points are closed, that period in which current flows into the coil. The condenser acts as an electron reservoir by providing a place for current to go as the points open. This prevents arcing across the points until the points are too far apart to arc, thus creating a clean current cut-off and avoiding the bleeding off of energy to the coil primary.

Atop the distributor is a distributor cap with one high tension line bringing power from the coil secondary in through the center and a high tension



The Conventional Ignition System

wire for each cylinder taking power out to each spark plug. Beneath the cap is a rotor which is mounted on the cam and spins around, distributing the coil's charge to each cylinder through the high tension wires. High tension wires, commonly called spark plug wires, consist of one wire for each cylinder between it and the distributor cap, and the wire from the coil secondary to the distributor.

The spark plug is a metal-shelled, porcelain-insulated unit that has a metal nub at one end for connection to the high tension wire. The other end is screwed into the cylinder head and has a center electrode and ground electrode coming out from the side and curving around. The two electrodes are usually spaced or gapped between .012 and .080 inch apart. The spark or 15,000 volt surge jumps or ionizes the gap just as its particular piston approaches top dead center on the compression stroke while the engine is idling thus igniting the fuel-air mixture, creating combustion and driving the engine.

Shortcomings inherent in the Kettering system became more acute with the modern engine and pollution control regulations. At the outset, segments of the Kettering system represented a compromise. With the points, it was a choice between running maximum current across the points for a strong signal to the coil primary while keeping the current low enough to achieve reasonable points life. The contact surface area of the points tends to erode, creating hills and valleys with only partial current flow resulting. Furthermore, a weak spring or an increased dwell time can cause points "bounce," which doesn't allow enough time for voltage to build, while a strong spring can cause excessive wear of the rubbing block. The breaker points cannot stay closed long enough for sufficient storage of energy in the coil for firing at high speeds.

While the breaker points were adequate for older cars, they are not for the cars of today and tomorrow, which demand as much as 25,000 volts consistently, through all speed ranges. One authority offers as the only alternative to electronic ignition the replacement of points every 100 hours of operating time. Converted to miles, 100 hours would be 5,000 miles at 50 miles per hour; however, since much driving time is spent at idle and lower speeds, points replacement would come considerably sooner. Failure to deliver the needed voltage to the spark can result in plug fouling. Fouled plugs increase the chance of misfiring, and if one cylinder or plug out of eight misfires, engine performance is reduced while exhaust emissions are increased tenfold. Also, while an extended spark duration would improve combustion, the additional heat would hasten deterioration of the spark plug electrodes.

THE ELECTRONIC AGE

The energy crisis notwithstanding, two catalysts had already sparked the electronic ignition revolution. They were the tightening squeeze by the government on auto emissions and advances made in solid state engineering. Auto emission regulations had a two-pronged effect on the conventional system. The regulations required more efficient engine operation as well as pollution control equipment that caused occasional low speed miss, rough idle and continuous surging. The requirements in the early 1970's coincided with advances in electronic units and resulted in Chrysler's marketing a breakerless electronic ignition system as standard equipment on its 1973 models and General Motors going a step further on 1975 models.

Solid state ignition systems first appeared in the 1950's. The intent was to use the aftermarket or non original equipment devices for greater speed. The units were unsuccessful due primarily to unreliable components. Transistorized units were still being introduced in the early 1960's and still failing for the same reason. Also in the 1960's, capacitive discharge electronic ignition units were introduced. These units take the low voltage from the battery and transform it to 300 to 400 volts. This is done by charging a capacitor then discharging it into the coil. With the greater voltage going into the coil a greater voltage comes out, with surges from the secondary set as high as 45,000 volts.

Furthermore, some of the capacitive discharge units include on their printed circuit boards silicon control rectifiers that take over the switching duties of the points, eliminating the critical problems in the distributor. The greater surge to the spark plugs significantly increases spark plug life, provides superior ignition performance through all engine ranges and improves cold weather starting. Capacitive discharge units were used briefly on some 1967 through 1969 Oldsmobile and Pontiac models, and though not now applied by Detroit such units remain popular through individual purchase by car owners.

Respectability came to electronic ignition in 1973 when Chrysler adopted it on all models. Ford tried a transistorized device that replaced the breaker points and condenser on a few models in 1964 and 1967 before giving it up until 1974 when it adopted an electronic ignition that is principally the same as Chrysler's. Chrysler eliminated the cam, condenser and points. In the distributor, atop what was the breaker plate sits a stationary magnet at one side and a pole piece that comes up through a small, encased pickup coil. In place of the cam is a multi-toothed, iron, geared wheel called a reluctor. It spins on the distributor drive shaft with the teeth corresponding to the cylinders of the engine. When the gap between the teeth passes the pole piece, the magnetic field is weak. When a tooth passes the pole piece, a signal is sent to an external transistor circuit unit, which amplifies it and sends it to the coil primary. The power transistor switches off briefly at the time of spark. There is no dwell compromise caused by slowly moving mechanical points and no wear, since the teeth of the reluctor wheel have an .008 inch clearance with the pole piece. The secondary circuit remains the same though Chrysler calculates extended spark plug life to 18,000 miles.

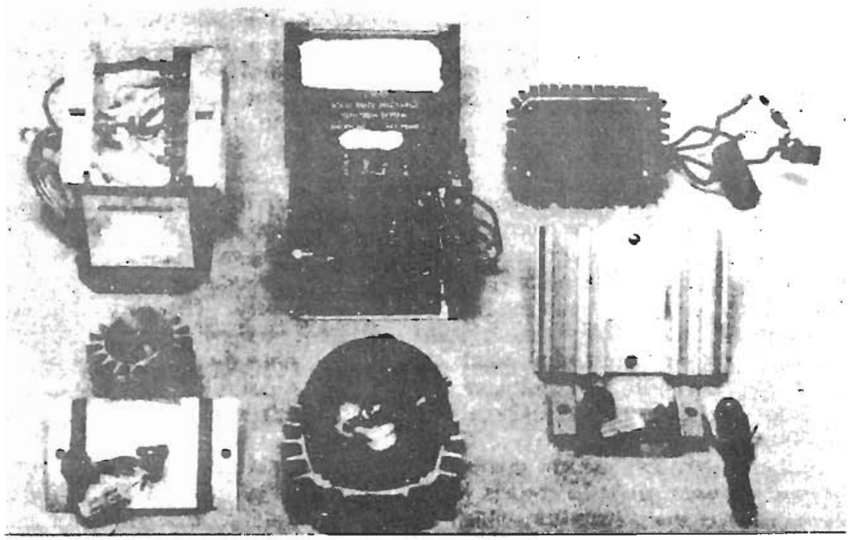
General Motors, which cranked up its research effort in 1965, went a step beyond Chrysler on 1975 models with its "High Energy Ignition." The heart of the system is the distributor, which contains a magnetic pulse generator and a unique electronic module that switches current flow into the primary windings of an integrated coil--the coil is housed in the distributor. A special silicon grease is used to transmit heat to the distributor housing eliminating the need for a heat sink. The distributor and cap have been made larger to accommodate the components. Current enters the distributor, passes through the coil primary and is grounded within the electronic module. A pole piece generates minute pulses of current in the pickup coil windings of the pulse generator. This signal triggers the electronic module to open the primary circuit of the coil and send an amplified current to the spark plugs in conventional fashion. General Motors expects more efficient burn combustion and, therefore, reduced exhaust emissions, improved performance, better gas mileage and decreased oil contamination caused by unburned gasses passing by the rings.

Those attributes closely mirror others offered both on original equipment and add-on devices with efforts aimed at eliminating or reducing the load of points to a non-problem level and sparking engines to greater, cleaner and more economical performance. American Motors, International Harvester and Jeep went to a breakerless points system in 1975. Furthermore, electronic components are expected by many in the automotive industry to replace all remaining mechanical segments of the ignition system within a few years.

The electronic ignition revolution has brought about a wide range of products offered with an even wider range of promises. Some that are called "electronic ignition" devices aren't. Many others function quite well and provide the motorist with benefits that will far exceed initial investment in such units. These true, electronic devices are not cheap.

One decided disadvantage in the initial phase of the electronic ignition revolution is cost and parts availability. Mass displays of points and condensers in different types of stores are commonplace. And, almost every gas station in the country carries an ample supply of both.

Electronic ignition devices will not enjoy similar availability for some time to come due to various reasons. One is that the service station operator who is open Sundays in remote areas and may stock dozens of $1 and $2 points and condensers is not likely to lay in much of a supply of the Big Three's electronic ignition components that range from $45 to $150.



THE BOOKS AND THEIR COVERS

These are only a handful of the numerous, so-called electronic ignition devices on the market today. Many come sealed in a tar-like substance. Some consist of little more than the tar, others can return the purchase price in cost savings within six months.

THE TIGER CD

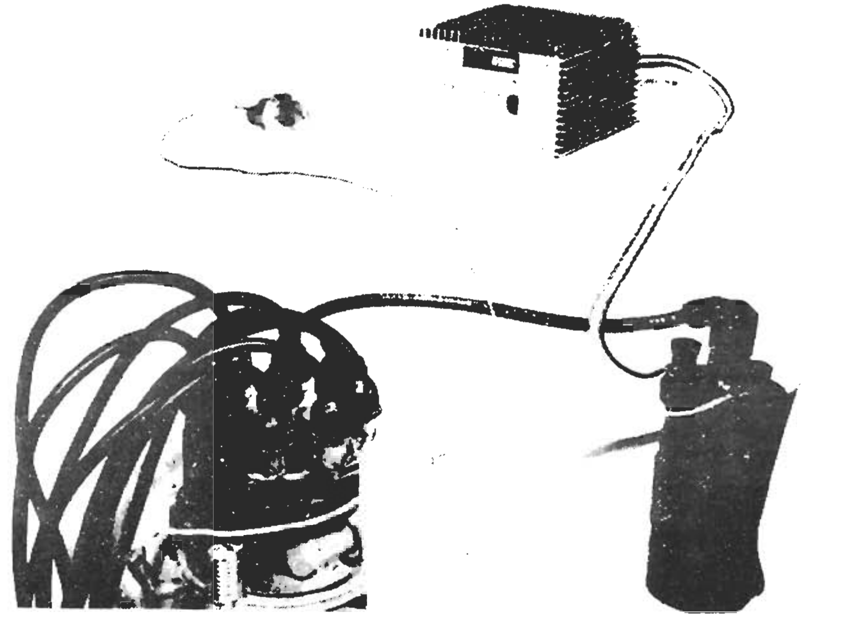
A Capacitive Discharge Ignition System That Provides A Greater Spark, Quicker

The TIGER is a solid state electronic device that consists of a transformer, transistors, capacitors, diodes, resistors, and a silicon controlled rectifier (SCR) mounted on a fiberglass printed circuit board. The entire assembly is housed in an extruded aluminum heat sink, which dissipates heat rapidly and makes the unit extremely weather resistant. The TIGER is not mechanical; it has no moving parts. It does not take the place of anything on the engine. It is an accessory that works best with the standard coil, distributor and spark plugs as recommended by the manufacturer of the vehicle.

The TIGER transforms battery voltage from 12 volts to 400 volts. As a result, the coil has 30 times the voltage it would normally have to produce the secondary circuit--about 45,000 volts. This compares with maximum voltage output on a standard-equipped vehicle of about 15,000 volts. Because the TIGER is a solid state electronic device that operates in millionths of a second, it produces full voltage in only 20 microseconds (20 millionths of a second) as compared to 80 microseconds in the standard system. These two factors--three times normal spark voltage and four times faster rise time, will fire all plugs at all times under almost any conditions or speed and keep them clean.

The TIGER also takes over the difficult switching duties of the points. The amount of amperage (power) at the points is reduced from six amperes at 150 volts to .5 amperes at 12 volts. In addition, the electronic switch, the SCR, in the TIGER senses when the points are open or closed and does the switching, thereby preventing "arcing" which burns points.

QUICK AND EASY



Installation of the TIGER averages 30 minutes and involves no rewiring.

POINTS LAST LIFE OF THE VEHICLE

The points in the distributor have small, thin contacts which are destroyed by burning. This burning is caused by the points making and breaking a high inductive current of four to six amperes at the rate of 9,000 times per minute when a vehicle is being driven at 50 miles per hour or 2,300 revolutions per minute (RPM). The TIGER cures this problem by using its SCR as an electronic switch. First the TIGER reduces the power to only .5 ampere across the points, then the SCR takes over the making and breaking of the current by switching on the power after the points close and switching off before they open. All of this is done electronically in millionths of a second. Because the arcing has been eliminated, there is nothing to burn the points.

Thus if the rubbing block is lubricated at the cam lobe about once a year, points will last the lifetime of the vehicle. Some points have a fibrous pad trailing the rubbing block. On this type, a few drops of oil should be dropped on the pad about once a year.

Others have no pad and on these, grease must be placed at the cam lobe where the rubbing block makes contact.

This maintenance step is not performed on the conventionally equipped ignition system because rather than simple lubrication, entire tune-ups are performed and the points replaced altogether.

Also, on the conventional or standard ignition, at high speeds the rapidity of the points closing and opening causes points to bounce and float. Points cannot close fast enough to follow the cam but close fast enough to bounce open thus greatly reducing the amount of voltage at the spark plug.

This bounce causes point burning and misfiring. But, on the time-constant circuit utilized with the TIGER's SCR, firing on a "bounce" is prevented so that the full voltage is available for the next true discharge.

SPARK PLUGS LAST FIVE TIMES LONGER

Three actions in the standard ignition destroy spark plugs. One is the lack of sufficient voltage to properly jump the gap. This is caused by a failure of the system to produce sufficient voltage at high speeds.

Another is the inability of the system to deliver the voltage fast enough (rise time) to the "sparking" point -- much of the power becomes lost through leakage. These first two actions cause plug fouling which can be temporarily cured by plug cleaning.

The third action is the duration of the actual spark--a spark that lasts long after it has done its job will burn off the electrodes. This burning off simply destroys the plugs.

The TIGER overcomes all three. First, the TIGER delivers up to 45,000 volts, three times normal, at all speeds--over the entire RPM range. Second, the TIGER takes only 20 microseconds to furnish full voltage at the plug as compared to 80 microseconds in the standard system--no time for leakage. And the third, the TIGER has a spark duration of only 300 microseconds compared to the extra long 1,200 microseconds in the standard system.

Thus the TIGER furnishes enough voltage fast enough to fire the plug, which keeps it from fouling and keeps the spark short enough to prevent burning. In fact, TIGERs have actually cleaned plugs in 200 miles of driving when installed in cars with old plugs. A new set of spark plugs on a vehicle equipped with a TIGER should last 50,000 miles and in many cases, spark plugs have lasted considerably longer.

Tigers also convert skeptics to boosters

The safety director and police chief of an Ohio town tried Tigers on two patrol cars. Mileage increases of 20 to 25 per cent plus no need for tuneups at 10,000 miles on the ruggedly-driven cars that previously required tuneups at 6,000 and 8,000 miles prompted installation of Tigers on the entire fleet.

Such is usually the case as skeptics and doubters, anxious for improved performance and decreased fuel consumption and maintenance costs, but generally leery, convert to Tiger capacitive discharge ignition and soon after, become believers:

"Both cars started every time last winter, and the temperature got to a -24 degrees here several days." —— C. F. W., Iowa

"I wish to inform you that I have one of your CDI's on each of my cars and I am more than satisfied with their performance. I consider them to be a necessary adjunct to the ignition system." —— J. L. S., Nebraska

"This thing really works. It raised the mileage of my Toronado to 17 mpg with air conditioning running, from 10–11 mpg." – B. R. B., California

"My gas mileage jumped 3 mpg after installing the unit." —— G. E. G., Virginia

"Just bought a new Comet. Sold the 72, with over 60,000 mi. on it and still the plugs and points, that came in it. (Had a "Tiger" from the start of course.) Was still doing over 25 mpg, WITH AIR." —— J. N., New Mexico

FROM THE MEDIA:

A Southern California newspaper auto editor reported mileage increases of 12 to 17 per cent depending on the driving and terrain.

His counterpart on a Tennessee newspaper stated that mileage in the city increased from 12.1 miles per gallon to 13.4 while at 50 miles per hour mileage jumped from 16 to 17.3. Zero to 60 acceleration went from 9.2 seconds to 8.8. He also reported "The points in the engine's distributor were in good shape after 12,000 miles and the spark plugs are still in good condition with no signs of misfiring or breaking down at high rpm." Normally, plugs just won't hold up this long under my kind of driving."

A Utah newspaper man reported "regular gas was used in place of premium with no pinging, even in uphill acceleration."

AND WHEN SOMETHING DOES GO WRONG:

"You have demonstrated the high integrity of Tri-Star and yourself by replacing the defective unit in a very business-like way. I appreciate it and will never tire of telling others of your backing of your product." —— R. P. L., California

"I'll be sure to pass the word of my satisfaction with the CDI, along with the fact that you stand behind your product and your customers." —— C. H. D., New Jersey

"Your service is superb, to say the least. I've been in electronics servicing for several years and it is rarely when one runs across service as outstanding as your own! Thank you for sending me replacement parts for the SST unit. I substituted them in and the unit works fine now. I'm looking forward to plenty of good service from my SST. It will be appreciated with the up-coming gasoline shortage." —— S. K., Tennessee

(A list of all names and addresses of the above is available on request to Tri-Star Corporation.)

TIGER ADVANTAGES–THE NET EFFECT

Tune-ups generally consist of replacement of spark plugs, points and condenser and a check and possible adjustment of the timing and dwell.

Cost of a tune-up has been creeping beyond the $40 mark.

With care taken to see that the rubbing block is lubricated at the cam lobe, dwell and timing shouldn't vary. Dwell is the amount of time the points remain closed. In a standard system, dwell time can be too long or too short. The TIGER's recycling ability overcomes that problem--the TIGER recharges to full voltage and is ready for the spark committment in microseconds irrespective of the amount of time (dwell) the points are closed. Timing is important in any ignition system, but timing is a mechanical operation. An erratic or rough running engine will soon be out of time. Because the TIGER promotes a smoother running, more efficient engine, the timing mechanism is not subject to stress and strain. Condensers rarely wear out on any system.

On a vehicle equipped with a TIGER with an eye toward 50,000-mile spark plug life and the points rubbing block lubricated annually at the cam lobe, THERE SHOULD BE NO NEED FOR TUNE–UPS, PERIOD! Some TIGER enthusiasts prefer to pull their spark plugs and re gap them at about 35,000 miles.

Instant Starting: Because the TIGER delivers such a large voltage to the plug, the resulting spark will fire any reasonable fuel/air mixture, lean or rich, cold or hot, every time. The secret of a quick start is to get the cylinders firing as soon as possible. Almost without exception the first cylinder will fire because of the huge voltage available from an always clean plug. It has been proven in the field that a TIGER will give instant starting at temperatures from 40 degrees below to 130 degrees above. Further, this instant starting reduces the drain and strain on the battery from the constant hard cranking necessary in a standard system. Remember that a battery is only 65% effective at 32 degrees and 40% at zero.

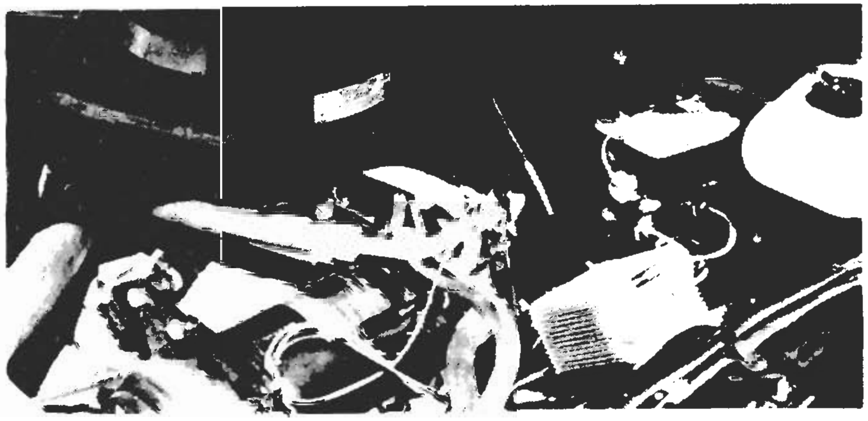
Increases Horsepower: The standard ignition creates erratic combustion; cylinders do not always fire on all power strokes with the same combustion efficiency. In some cases a cylinder may not fire at all (misfiring). In short, seven cylinders are working and the eighth is loafing. Again this loss in power is directly due to burnt or fouled plugs, burnt points, point bounce and erratic timing. The TIGER eliminates all these problems so there is a definite gain in power in keeping the engine at peak efficiency.

Increases Gas Mileage: As stated above, the TIGER eliminates erratic combustion and misfiring thus recapturing the maximum horsepower of the engine. In addition the TIGER spark burns the fuel/air mixture more completely and efficiently in the combustion chamber. The actual result of this is an improvement in gas mileage that can go as high as 15%. Further, this super hot spark will allow some vehicles designed for Ethyl to use Regular or non-leaded gasoline without pinging.

Improves Acceleration and Performance: The standard ignition has a time lag in coping with rapid changes in engine RPM. Sudden acceleration (or deceleration) could catch it on a misfiring cylinder. The poor spark is unable to handle the change in fuel/air mixture. As stated above the TIGER spark is electronic -- it is always there with extremely high reserve voltage to take care of these situations. Because friction and tortional vibration caused by misfiring or poor timing is eliminated the engine runs smoother at any speed including idle.

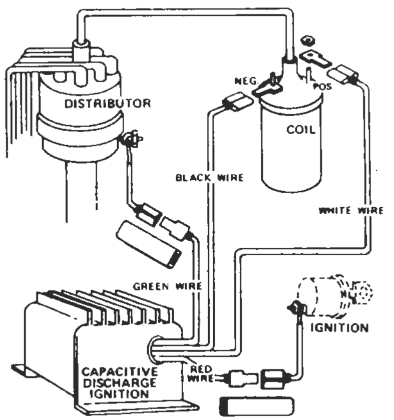
Reduces Engine Repairs and Maintenance: Carbon, varnish, lacquer and sludge deposits inside the engine are residues caused by incomplete combustion. These residues contaminate the oil and because they are abrasive, cause accelerated wear to engine components. Because the TIGER promotes such complete combustion, these deposits and residues are reduced to a minimum. All of this means a cleaner engine operating with clean oil lubricant--wear and tear is greatly diminished which means less engine breakdown and repairs.

Reduces Exhaust Pollution: Much of the pollution coming out of the exhaust is unburned fuel (hydrocarbons) plus residues of the burned fuel. The pollution control mechanisms on current vehicles attempt to return the unburned fuel back to the engine and filter the residues. These devices degrade the performance of the engine in a variety of ways, including harder starting. The efficiency of the TIGER in reducing residues and unburned fuel makes the work of the positive crankcase ventilation much easier. Several tests have shown that a new car equipped with a TIGER at the outset will show no increase in exhaust pollution a year later. Again, another benefit to having the TIGER maintain peak efficiency is a reduction in emissions. This is the same principle used by the Environmental Protection Agency's requirement that new cars be equipped to go 50,000 miles before a tune-up is needed--decreasing the between tune-up periods in which there is an efficiency loss and emission increase.

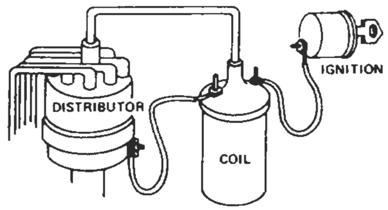


Neither the engine nor the TIGER can be damaged if a mistake is made in installation. The TIGER has a switch that permits the motorist to drive with the TIGER in operation or as if the TIGER wasn't on the vehicle. Main purpose of this is to permit motor work or a tune-up check to be done with standard shop equipment. It also allows a driver to evaluate the performance of the TIGER as compared with standard ignition. And, in rare cases where failure of the TIGER occurs, a switch to standard bypasses the unit altogether.

IGNITION AFTER CDI HOOK UP

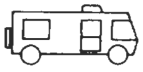


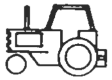
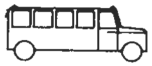
IGNITION BEFORE CDI HOOK UP



TIGER APPLICATIONS







The TIGER is compatible on all 12-volt, negative-ground engines that use a battery, external coil, spark plugs and alternator or generator.

This includes virtually all American made automobiles through 1975. It also includes most foreign models, buses, trucks, farm tractors, heavy equipment, tow motors or forklifts, irrigation pump engines, large compressor engines, power boats, large rider lawn mowers and many others.

There are countless applications in the industrial and farm areas ranging from self-propelled implements to stationary engines.

The more fixed or constant the load, the greater the benefit from the TIGER: while the mileage and horsepower gain on an automobile can reach 15 per cent, on vehicles like tow motors or farm tractors the improvement can reach 18 or 19 per cent.

Further, on the stationary engines constantly running at one speed like irrigation pump engines, the gain is even greater.

Installation of the TIGER on vehicles that have been converted to liquified propane or butane gas carries a decided advantage in that such vehicles are often hard starting and perform sluggishly. An immediate and marked effect can be noticed on an LPG or LBG converted vehicle when the TIGER is added.

Drag and stock car racers are a natural. A TIGER can clip .75 of a second from elapsed time of a dragster.

However, the criteria of 12-volt, negative-ground, engines that use a battery, external coil, spark plugs and alternator or generator must be met.

Thus, the TIGER cannot be used on magneto or six-volt vehicles, electric forklifts, positive ground applications, outboard motors that don't have an external coil or smaller power lawn mowers that have neither battery, external coil nor alternator or generator.

There are many other cases in which the TIGER can be used and others in which it cannot. If in doubt, check with Tri-Star Corporation.

NEW AND OLD -- MIXED REACTIONS

Initially, new and freshly-tuned cars and older models will react differently after installation of a TIGER. On new and recently tuned vehicles, there may be no appreciable or noticeable change in the car's performance.

At 5,000 miles, when most tune-ups begin to degrade, the TIGER will maintain peak engine efficiency and continue to maintain such efficiency through up to 50,000 with no degradation as long as the distributor rubbing block is lubricated about once a year. Around 50,000 miles with a TIGER only spark plug replacement is needed.

On standard ignition, the degradation beginning at 5,000 miles would continue until a tune-up becomes necessary at 10,000 or 15,000 miles. After the tune-up, the cycle would begin again.

On older cars, installation of the TIGER will show an immediate effect in ease of starting, increased mileage and greater performance.

THE TIGER

A TECHNICAL LOOK

All SCR capacitive discharge ignition systems operate on the same basic principle, although the circuitry and methods of operation may differ. The following is a description of an advanced, current design, and the method of operation.

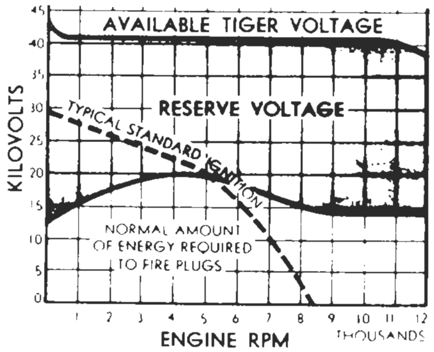
The TIGER system contains the usual dc to dc converter (in unusual form), storage element (capacitor), switching SCR, and associated trigger and control circuitry. It uses the standard coil supplied on the automobile, and can be installed in about 30 minutes.

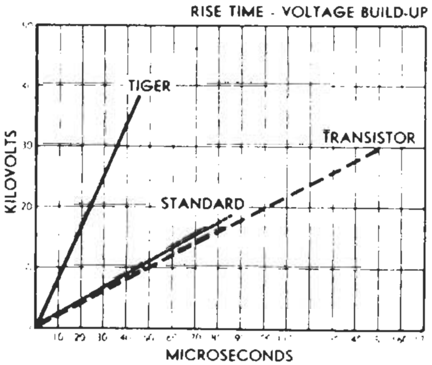
The applied battery voltage (see schematic) is converted to approximately 400 volts from a nominal 12 volts by the converter circuitry (2 transistors and transformer). This converter operates as follows: the battery voltage is applied to the transformer center tap (H) causing current to flow through resistors 15 and 18, and simultaneously through the two transistors. Since the two transistors are not equal in resistance, one half of the winding will have a higher current flow.

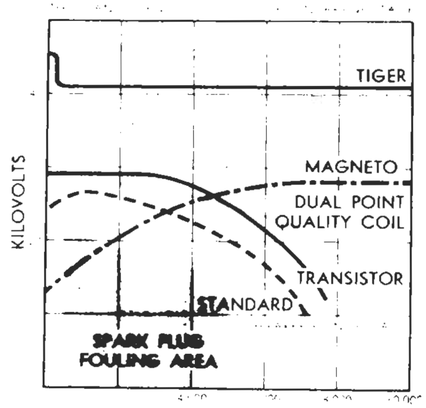
Assuming that the lower half of winding (H) carries slightly higher current than the upper half, the voltages developed in the feedback winding (E), tend to turn-on the upper transistor (21), and turn-off the lower (20). This increases the current through the lower half of the transformer winding. The increase in current further drives the upper transistor into conduction and the lower transistor into cut-off. Such action simultaneously transfers energy to the secondary of the transformer, and this energy is rectified by diodes 11,12, 16 and 17. When the current reaches a value that can no longer increase, due to the saturation resistance of the transistor and transforms core saturation, the feedback signal applied to the transistor decreases, causing this transistor to increase resistance. The decreasing current causes a reversal of the applied feedback signal turning off this transistor, and turning on the lower transistor, again supplying power to the secondary. Once this action is started, it continues at a rate of approximately 8000 times per second. Resistor 18 is the base current limiting resistor. 15 supplies starting bias.

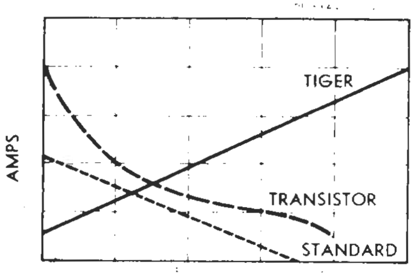
A major drawback in the earlier CDI designs was employment of much lower frequencies which cause undesirable noise in an auto's sound amplifiers. The higher frequency used on the TIGER removes the problem of feedback of inverter signal through the battery impedence and into the radio or stereo system.

Voltage developed in the transformer secondary is rectified by the diode bridge and charges capacitor 6 through the coil primary windings connected to









the output terminals. The capacitor is charged immediately whenever power is applied by turning on the ignition switch.

At this time, let us assume the breaker points are closed. The battery voltage applied in this situation not only supplies power to the converter; a portion of the current also flows through the series connected diode 22 and resistor 23 through the points and to ground. This current, (approximately 400 milliamperes) supplies the gate signal to the SCR through the following sequence: When the engine is cranked and the first cylinder reaches the position at which the spark plug should fire, the points open. The current flowing through resistor 23 now flows through diode 3 to capacitor 2, driving the gate positive, and turning the SCR on. With the SCR turned on the energy previously stored in capacitor 6 discharges through a loop consisting of capacitor 6, SCR 7, diode 10 and the ignition coil. The applied coil voltage increases to the same level as the voltage stored in capacitor 6 in a period of approximately one-tenth microsecond. This current flow continues until the voltage across capacitor 6 approaches zero.

In the circuit made up of capacitor 6, SCR 7 and the coil, capacitor 6 and the coil form a resonant circuit. The "flywheel effect" of this circuit maintains the current flow in the same direction, which causes a reversal of the charge in capacitor 6, charging it in such reverse direction to approximately 300 volts. This occurs since the transformer appears in the circuit as a relatively large parallel inductance.

When the voltage in the capacitor can no longer rise from the "flywheel effect," the current attempts to reverse. This returns the SCR to its off position. The reversed current flow simultaneously turns on all the bridge diodes, and the capacitor recharges through these diodes toward its normal state. The inverter completes the recharge, replacing only the energy used in the external load (coil).

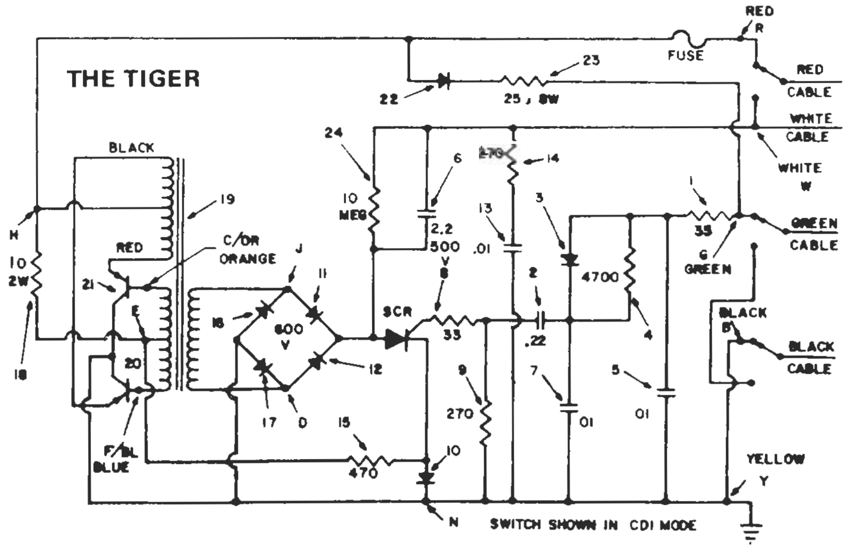
Since the original CDI design efforts, much more efficient core materials for the transformer have become available. The TIGER, utilizing these materials, which require considerably less copper in the windings, becomes far more efficient. The power supply is capable of delivering full energy to the capacitor at speeds of well over 10,000 RPM—far beyond the capability of most internal combustion engines. (10,000 RPM is equivalent to driving 200 miles per hour in high gear on an average car.) The inverter has adequate time to recharge the capacitor, and the system operates using the same ballast resistor used in the standard Kettering system. Thus, there is no need to alter any wiring in a vehicle when installing this advanced CDI system.

Increased Spark Repetition Rate

Previous CDI designs, in which the inverter operated at frequencies of a lower range, required that the inverter change frequency as engine speed increased. This method of operation had inherent problems since certain engine rates correspond directly to the frequency or the multiples of the frequency of the inverter. Inverter ripple resulted in the reduced effectiveness of the triggering circuit, and in some cases, caused sync miss. In the TIGER, the repetition rate of the inverter is much higher; even at the highest engine speeds, the inverter has many cycles in which to recharge the capacitor so a synchronization of the spark rate and the inverter cannot occur.

Point Problem Eliminated

One difficulty with Kettering-type systems results from a phenomenon commonly known as "point bounce." Since, at higher engine speeds, the breaker points are moving at very rapid rates, as they close they have a tendency to "bounce" open, thus delaying the recharge of the magnetic field in the ignition coil. This results in substantial loss of energy at higher engine RPMs. In the TIGER system, the inverter immediately recharges the capacitor—even before the points reclose. Energy cannot be degraded by any action of the points. It is possible, however, if the points were to reclose and reopen due to point bounce, that the unit would be called upon to supply energy which, in the actual combustion process, would not be necessary. To prevent this occurrence, capacitor 2 and resistor 4 serve as a time-constant, delaying the firing of the SCR until the points have been closed for a definite period of time. This delay is approximately .5 millisecond, much longer than the period of point bounce. Such delay removes the possibility of refiring until the points have been actually mechanically closed and reopened by the distributor cam at the proper moment. A decided advantage to high performance engines is evident. Even in cases of a distributor in poor condition, the ignition will operate properly.



A silicon controlled rectifier is the switch in the capacitive discharge ignition system. The transistors are the d-c to d-c converter with capacitor C6 the storage element. The transformer (ignition coil) is not shown.

Protective Circuitry

Although the SCR is an excellent switch at normal temperatures, it exhibits certain characteristics at temperature extremes which could be quite detrimental to efficient engine operation. It is necessary, therefore, to correct these deficiencies through other components associated with the trigger circuitry Silicon-controlled rectifiers, when reverse biased, exhibit much faster turn-off times, resulting in a substantial increase in break-over voltage. Previous designs obtained this reverse bias by floating the cathode above ground and supplying the bias voltage from the battery supply. The TIGER utilizes an entirely different approach which allows grounding of the coil primary and improves stability, since the bias voltage is positively controlled. Bias is obtained in this circuit by current supplied through resistor 15 across diode 10. Since the voltage drop of the silicon diode is approximately .6 volt, the cathode becomes positive in relation to the gate which is returned through resistor 9 to ground. This negative bias assures absolute turn-off stability. With this method of bias, the possibility of damage to the circuitry as a result of external short circuits is completely removed. The time-constant associated with capacitor 2 and resistor 9 is such that the charge time of capacitor 2 is only a small fraction of the ringing frequency of the coil; thus, no provision need be made for discharge of this capacitor in order to prevent refiring. Capacitors 5 and 7 serve as bypass for high-frequency components which may be induced in the external firing circuit and prevents damage to the SCR from the external high voltage transients which could occur from the secondary spark.

Coil And Rise Time

Rapid rise time in the secondary spark is of primary importance. The more rapidly the voltage rises to the point of firing, the less energy is dissipated by fouling resistance, a condition associated with even a clean spark plug. Since the trigger circuitry in the TIGER has an extremely rapid rise to the gate of the SCR, the SCR is turned-on in a fraction of the time of other systems, thereby increasing the rate of rise in the secondary, and reducing the heating effect caused by slow turn-on of the SCR.

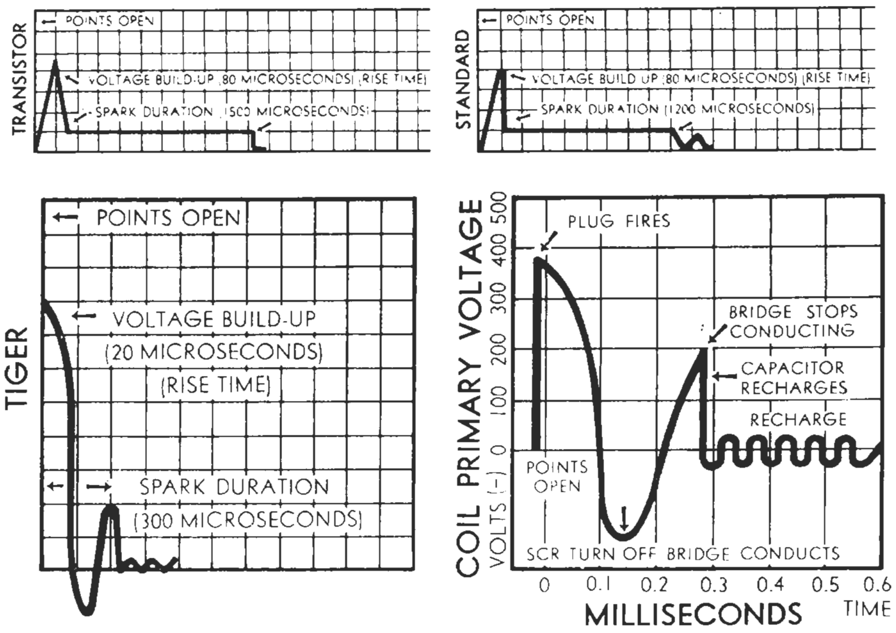
Although many experiments have been conducted with regard to special coils, these studies have shown that the increase in efficiency brought about by special coils is so small that the additional expense is unjustified. The same tests proved that the standard coil supplied with the automobile is more than adequate.

Design Requirements

Improvements specifically designed into the system to avoid problems incurred with earlier versions are as follows:

* The inverter frequency was made as high as possible but compatible with transistor switching times and reasonable losses avoiding inverter feed into radios and stereos and reducing inverter effect on triggering of the SCR. Inverter must operate at full load from 40 below to 200 F.
* Circuitry was made as simple as possible with no unpredictable "crutches."
* A ferrite transformer core with high permeability and high saturation flux density is used to increase the efficiency of the inverter substantially and further allow the handling of higher power levels which enables the TIGER to operate and deliver full voltage at any useable engine RPM.
* Method of obtaining bias for SCR turnoff was made more controllable and possibility of damage in installation due to improper connection was eliminated. Trigger wave forms are as sharp as possible in order to reduce SCR heating effects.

SPARK DISCHARGE CHARACTERISTICS



* Reducing the number of components materially reduced the probability of failure and permitted the use of components providing higher safety factors because of the additional space available on the circuit board.
* For those using the kits, assembly time was decreased because a reduced number of components allowed for a location of all parts on one circuit board with no need for interconnection jumpers.

Packaging

Ignition systems often are exposed to environmental conditions not necessarily suitable for electronic-type equipment. They must withstand vibration, moisture, high and low temperatures and, in certain cases, voltages which are not properly controlled by the alternator or generator system. These requirements must be taken into account in proper design of the final package.

The TIGER system is housed in a special extruded aluminum case, which provides several unique features: The transistors in the inverter section are more efficiently cooled than in comparable designs, since heat is extracted from both the normal mounting base and the transistor top. This makes it possible for the transistor to dissipate substantially higher power.

The heat sink functions under the principles of radiation and convection. The finned casing further aids in air flow.

Last and quite important, by mounting the transistors internally in the heat sink, the only external opening is that required to run out the connecting wires. The system is highly moisture and water resistant, making it suitable for installation on boats and other vehicles in exposed areas, where other designs would be impractical or totally inoperative. However, no effort should be made to waterproof a TIGER since that would invite condensation.

CERTIFIED CDI LABORATORY TEST

December, 1972

MANUFACTURER	COST	WARRANTY	POWER LOSS WATTS IDLE (Note 1)	MAX RPM (Note 2)	FOULED PLUG LOAD (Note 3)	SPARK DURATION (T) (Note 4)	MAX RPM NO BALLAST (Note 5)	CHANGE OVER SWITCH	LOW TEMPERATURE VOLTAGE · 20°F (Note 6)	ENERGY (JOULES)	PEAK SPARK CURRENT (I)	PEAK POWER RATIO (Note 7)
Tiger SST	39.95	Life	10.64	7500	150K	310	12,000	Yes	4.7	.15	.12	.55
Tiger 500	49.95	Life	8.4	9000	150K	350	12,000	Yes	3.6	.15	.175	.91
Mark 10-B	59.95	1 Yr.	14.0	10500	150K	250	10,500	Yes	5.0	.086	.10	.37
Mark 10	44.95	1 Yr.	10.92	6300	200K	250	7,500	No	6.0	.09	.12	.47
EDX	89.95	Life	2.8	7500	200K	250	10,500	Yes	6.0	.11	.11	.41
Cragar	69.95	1 Yr.	11.2	7500	150K	260	12,000	No	3.6	.12	.12	.45

*

Note 1. (Power Loss) Input volts (14 volts) multiplied by input amperes = watts, unit untriggered.

Note 2. (Maximum RPM) Maximum RPM obtainable without misfire 14 volts input, .5 ohms resistance in series with input power.

Note 3. (Fouled Plug Load) Minimum resistance shunting a 15 kilovolt gap which allows consistant firing at 3600 RPM, 8 cylinder engine.

Note 4. (Spark Duration) Total time in microseconds spark exists across a 15 kilovolt gap, measured in the secondary of the coil.

Note 5. (Maximum RPM, no ballast resistor) Maximum RPM obtainable with no misfire, 14 volt input, no series resistance in input power.

Note 6. (Low Temperature Voltage) Minimum voltage to fire a 15 kilovolt gap at -20° F.

Note.7. (Peak Power Ratio) Determined as PPR = EIT.

E = 15 kilovolts

I = Peak spark current (amperes)

T = Spark duration in microseconds

The foregoing is a true and accurate account of tests run December, 1972

MESA COLLEGE
Grand Junction, Colorado

By ______ DIRECTOR OF OCCUPATIONAL STUDIES

By ______ AUTO MECHANICS INSTRUCTOR

By ______ AUTO MECHANICS INSTRUCTOR

State of Colorado
County of Mesa SS

Subscribed and sworn to before me this 3rd day of January, 1973.

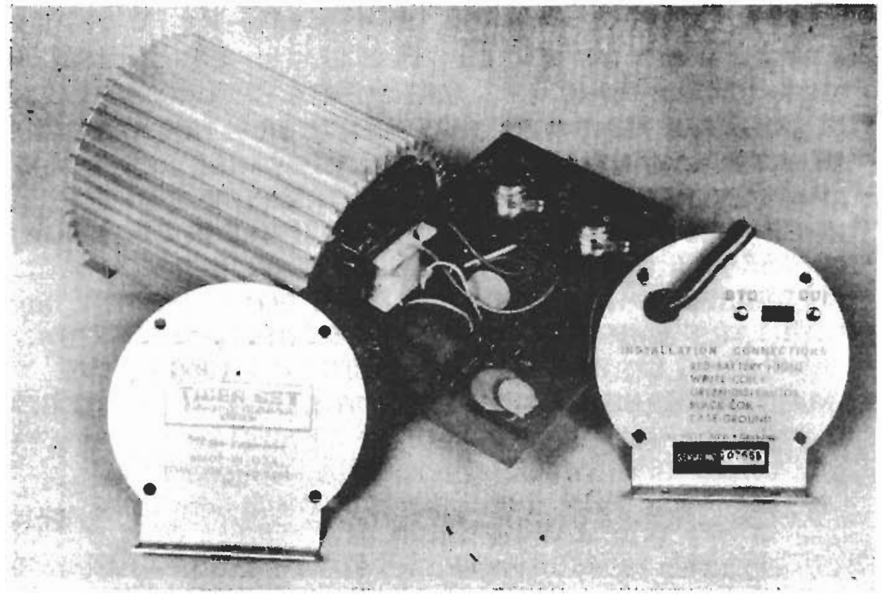
______ NOTARY PUBLIC

My commission expires 9/20/75

* **Modifications since the test was taken have improved the peak spark current and peak power ratio of the TIGER SST over figures shown. See facing page.**

EVERYTHING, BUT . . .

The TIGER is not a cure-all or mechanic. It will not repair broken wires, slipped timing, broken rotors or caps, cracked spark plugs, burned wires, flat tires or transmissions. The TIGER will do what it was designed to do. It will not do what it wasn't designed to do.



TIGER SST C D TECHNICAL DATA

Input Voltage: 12 Volt nominal negative ground system with either generator or alternator.

Triggering Source: Breaker or breakerless points or any other suitable source.

Input Amperage: .6 to 6 amperes depending on RPM; 2.5 amperes at 2,000 RPM.

Output Pulse: .35 microseconds rise to peak to coil primary.

Available Power: .15 joule per pulse.

Spark Duration: 300 microseconds.

Minimum Firing Voltage: 5.5 Volts.

Available Output Voltage: Cranking - 8v, input 30,000 Volts. 500 RPM - 12v, input 45,000 Volts. 7500 RPM 12v, input 40,000 Volts.

Peak Spark Current: .17 Amp

Peak Power Ratio: .85

Switch is two position with gold-plated contacts.

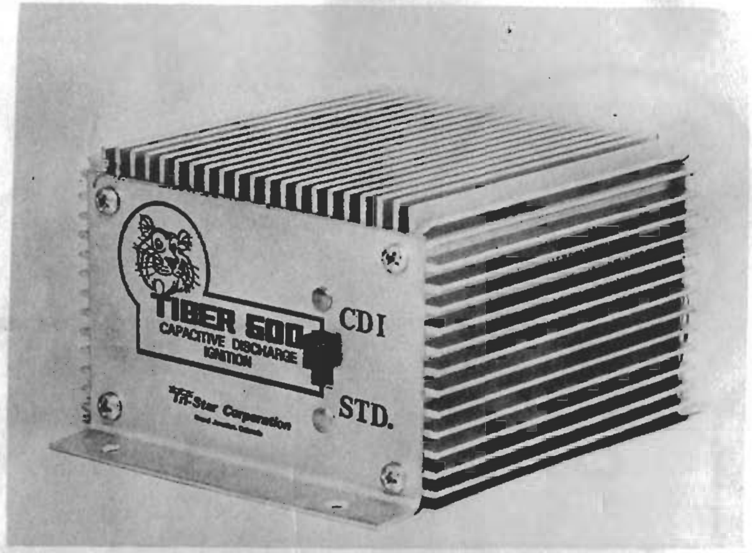
Size: 4½" x 4½" x 5" – 2 pounds

ASSEMBLED – READY TO INSTALL

Unit warranted free of defects in material, workmanship and operation for the life of the vehicle on which it is originally installed.

SIMPLI-KIT

All parts, solder, programmed step-by-step assembly instructions. All parts warranted free from defects for 90 days.



TIGER 500 C D TECHNICAL DATA

Input Voltage:	12 Volt nominal negative ground system with either generator or alternator.
Triggering Source:	Breaker points or any other suitable source.
Input Amperage:	.6 to 8 amperes depending on RPM; 1 ampere at normal speed.
Output Pulse:	.3 microseconds rise to peak.
Available Power:	.15 joule per pulse.
Spark Duration:	350 microseconds.
Minimum Firing Voltage:	3.6 Volts
Available Output Voltage:	Cranking - 8v, input 32,000 Volts, 500 RPM - 12v, input 50,000 Volts. 9000 RPM - 12v, input 45,000 Volts.
Peak Spark Current:	.175 Amp
Peak Power Ratio:	.91

Switch is two position with gold-plated contacts.

Size: 4¼" x 4¼" x 2¾" – 2 pounds

TIGER 500 has fuse circuit to protect TIGER components and auto ignition wiring from extraordinary and unusual power surges.

ASSEMBLED – READY TO INSTALL

Unit warranted free of defects in material workmanship and operation for as long as you own it!

(Postage paid **1 – EACH $53.95**

Printed in USA

OPERATION OF A STANDARD IGNITION SYSTEM

The standard ignition system of a gasoline engine consists of an ignition coil, a distributor with points and condenser, ignition harness and spark plugs. This standard system contains two circuits: a primary (12 volts battery) and a secondary (15,000 volts). Current from the battery/alternator flows through the primary circuit of the ignition coil when the ignition points are closed. When the cam lobe in the distributor opens the ignition points, the primary circuit in the ignition coil is broken and the condenser discharges. Just as the points in the distributor open the distributor rotor lines up with a cap segment connected to one of the spark plugs and the pressure (voltage) behind the secondary current rushes off to energize the plug, ionize the gap, and project the current across the spark plug gap. All this happens at about 18,000 times per minute at 4500 RPM in an eight-cylinder engine. (Fig. 1) The coil requires a certain amount of time to create the maximum secondary voltage. Because it is so time dependent the coil system produces a diminishing spark as engine RPM (or car speed) increases - the faster you go the more spark you need but the less you get. This low or diminished spark is unable to get maximum combustion in the cylinder. The residue then settles on the plug electrodes fouling them so the plug must be replaced often. Other results of this weaker spark are wasted gas, increased exhaust pollution and, of course, poor performance. (Fig. 2)

The efficiency and life expectancy of spark plugs is strongly influenced by the conditions that exist inside the engine's combustion chambers: fuel/air ratios, compression ratios, supercharger boost, exhaust system backpressure and type of gasoline. When an engine is operated at low speeds or with light loads, the temperatures inside the cylinders fall to their lowest point. When this temperature at the spark plug tip falls below 750 degrees deposits will accumulate on the plug tips which will not be burned off. This condition is called spark plug fouling. Sharp edges on the plug electrodes tend to concentrate ionization and lower the voltage requirement, but electrodes begin to erode away with use, rounding the electrodes and widening the gap. These changes increases the plug's voltage requirement and when the voltage required to produce a spark finally exceeds the output of the standard ignition system, the plug will no longer fire. Spark plug voltage requirements are raised by deposits on the plug, high cylinder pressures, low temperatures (which separate the air molecules), lean mixtures, and overheated electrodes.

Thus engines need new plugs every 10,000 to 12,000 miles depending on how the car is driven and how hard the engine is on electrodes – some combustion chambers have a high degree of "swirl" designed into them that causes the electrodes to erode irregularly and rapidly. It takes **twice** as much voltage to fire a plug at high speeds as it does at idle, and **three times** the voltage under hard acceleration.

The "points" are located in the distributor. Basically they switch the primary circuit on and off. Since the amperage (power) is high they have a tendency to arc thus burning the points. At high speeds points have a tendency to bounce. This causes "missing" in the engine.

WHAT DOES A TIGER DO?

1. The Tiger transforms applied battery voltage from a nominal 12 volts to 400 volts. As a result the coil has 30 times the voltage to produce the secondary circuit – almost 50,000 volts. Because the Tiger is a solid state electronic device

which operates in millionths of seconds it produces full voltage in only .5 microseconds (five millionth of a second) as compared to 80 microseconds in the standard system. These two factors — three times normal spark voltage and 40 times faster rise time, will fire all plugs at all times under any conditions or speed and keep them clean. Because of this spark plugs will last for up to 70,000 miles. (Fig. 3)

The Tiger takes over the difficult part of the switching duties of the points. The amount of amperage (power) at the points is reduced from 6 amperes to .5 amperes. In addition the electronic switch (SCR) in teh Tiger senses when the points are open or closed and does the switching. This prevents the "arcing" which burns points. Because the points cannot "burn" they will last for the life of the car. (Fig. 4)

At high speeds the rapidity of the points closing and opening cause "point bounce." What happens is that the points in closing fast can bounce open thus reducing greatly the amount of voltage at the spark plug.

Again in a standard ignition point bounce causes point burning and misfiring. Because of a time-constant circuit the electronic switch (SCR) prevents firing on a "bounce" so that the full voltage is available for the next true discharge.

TIGER ADVANTAGES

1. **Longer Lasting Spark Plugs:** Three actions in the standard ignition destroy spark plugs. One is the lack of sufficient voltage to properly jump the gap. This is caused by failure of the system to produce sufficient voltage at high speeds. Another is the inability of the system to deliver the voltage fast enough (rise time) to the "sparking" point — much of the power becomes lost through leakage. These first two actions caused plug fouling which can be temporarily cured by plug cleaning.

The third action is the duration of the actual spark — a spark which lasts long after it has done its job will burn off the electrodes. This burning off simply destroys the plugs.

The Tiger overcomes all three. First, the Tiger delivers up to 45,000 volts (three times normal) at all speeds to 10,000 RPM — which is more than most engines will turn. Second, the Tiger takes only .5 microseconds (40 times faster) to furnish that full voltage at the plug as compared to 80 microseconds in the standard system — no time for leakage. (Fig. 3) And third, the Tiger SST has a spark duration of only 300 microseconds (¼th) compared to the extra long 1200 microseconds in the standard system. Thus the Tiger furnishes enough voltage fast enough to fire the plug which keeps it from fouling; and keeps the spark short enough to prevent burning. In fact, Tiger's have actually cleaned plugs in 200 miles of driving when installed in cars with old plugs. Thus a new set of spark plugs should last at least 70,000 miles or almost the life of the car. There is no other way to extend the life of spark plugs. (Fig. 5)

2. **Longer Lasting Points:** The points in the distributor have small and thin contacts which are destroyed by burning. This burning is caused by the points making and breaking a high inductive current of 4-6 amperes at the rate of 18,000 times per minute. The Tiger cures this problem with an electronic switch called an SCR. First the Tiger reduces the power to only .5 amperes; then the SCR takes over the making and breaking of the current by switching on the power **after** the points close and switching off before they open. All of this is done the electronic way in millionths of a second. Because the arcing has been eliminated there is nothing to burn the points, so they should last as much as the life of the car.

3. **Instant Starting:** Because the Tiger delivers such a large voltage to the plug, the resulting spark will fire any fuel/air mixture, lean or rich, cold or hot, every time. The secret of a quick start is to get the cylinders firing as soon as possible. Almost without exception the first cylinder will fire because of the huge voltage available from an always clean plug. It has been proven in the field that a Tiger will give instant starting at temperatures from 50 degrees below to 130 degrees above.

Further, this instant starting reduces the drain and strain on the battery from the constant hard cranking necessary in a standard system. Remember that a battery is only 65% effective at 32 degrees and 40% at zero.

4. **Increases Horsepower:** The standard ignition creates erratic combustion; that is, any cylinder does not always fire on all power strokes with the same combustion efficiency. In some cases a cylinder may not fire at all (misfiring). In short seven cylinders are working and the eighth is loafing. Again this loss in power is directly due to burnt or fouled plugs, burnt points, point bounce and erratic timing. The Tiger eliminates all these problems so there is a definite gain in power.

5. **Increases Gas Mileage:** As stated in the above paragraph, the Tiger eliminates erratic combustion and misfiring thus recapturing the maximum horsepower of the engine. In addition the Tiger spark burns more completely and efficiently the fuel/air in the combustion chamber. The actual result of this is an improvement in gas mileage up to 15%. Further, this super hot spark permits the use of regular or no-lead gasoline without pinging.

6. **Improves Acceleration and Performance:** The standard ignition has a time lag in coping with rapid changes in engine RPM. Sudden acceleration (or deceleration) could catch it on a misfiring cylinder. The poor spark is unable to handle the change in fuel/air mixture. As stated above the Tiger spark is electronic -- it is always there with extremely high reserve voltage to take care of these situations. Because friction andtortional vibration caused by misfiring or poor timing is eliminated the engine runs smoother at any speed including idle. (Fig. 5)

7. **Reduces engine repairs and maintenance:** Carbon, varnish, lacquer and sludge deposits inside the engine are residues caused by incomplete combustion. These residues contaminate the oil and because they are **abrasive,** cause accelerated wear to engine components. Because the Tiger promotes such complete combustion, these deposits and residues are reduced to a minimum. All of this means a cleaner engine operating with clean oil lubricant—wear and tear is greatly diminished which means less engine breakdown and repairs.

8. **Reduces exhaust pollution:** Much of the pollution coming out the exhaust is unburned fuel (hydrocarbons) plus residues of the burned fuel. The pollution control mechanisms on current vehicles attempt to return the unburned fuel back to the engine and filter the residues also. These devices degrade the performance of the engine in a variety of ways, including harder starting. The efficiency of the Tiger in reducing residues and unburned fuel makes the work of the PCV much easier. Field and laboratory tests prove that a new car equipped with a Tiger at the outset will show **no** increase in exhaust pollution one year later.

9. **Eliminates tune-ups:** Basically the end result of a tune up is new spark plugs, new points and condenser, and a check of the timing and dwell. It has already been discussed what the Tiger accomplishes as regards to spark plug and points. Condensers almost never wear out in any system. Dwell is the amount of time the points remain closed. In a standard system, dwell time can be too long or too short. The Tiger's recycling ability overcomes that problem—the

Tiger recharges to full voltage and is ready for the spark commitment in microseconds irrespective of the amount of time (dwell) the points are closed. Timing is important in any ignition system, but timing is a mechanical operation. An erratic or rough running engine will soon be out of timing.

Because the Tiger promotes a smoother running more efficient engine, the timing mechanism is not subject to stress and strain. Field tests have proven that engines can run for years without the necessity for tune-ups.

10. **New cars:** There will be little or no noticeable effect of the Tiger when installed on a brand new car. However, as the miles and months go by the owner will notice it still runs like new. Also will be noted the saving to the pocketbook—since there will be no outlays for tune-ups, plugs, points, etc.

11. **Old cars:** The Tiger effect is more noticeable when installed in old cars. It takes about 200 miles to clean the plugs, etc; then the Tiger effect will be very pronounced especially in starting, acceleration and performance. As time goes by the engine will run more and more like new. Of course, there are the pocketbook savings too.

12. **LPG conversions:** While the conversion of gasoline engine to LP (propane) has some advantages—such as reduced pollution—there are also some definite drawbacks: hard starting and sluggish performance. The ability of the Tiger to fire **any** fuel/air mixture under all weather conditions, hot or cold, overcomes these problems. The LP engine will start better and run smoother with the installation of the Tiger. To achieve the full benefits of an LP conversion, the Tiger is a must.

13. **Drag and stock car racers:** The Tiger is a natural for all cars involved in either drag or stock car races. The Tiger will clip .75 from the ET of a dragster. (Note: the Tiger cannot be installed on the magneto cars such as fuel eliminator and funny car classes). The Tiger's racing advantages are: ability to deliver high voltages at the higher rpm's, elimination of point bounce, burn any fuel/air mixture, and fire any hot or cold spark plug. The Tiger installation alone can add 15% more horsepower to the engine. (Fig. 6)

14. **Other installations:** The Tiger can be installed on any engine with generator/alternator, distributor and coil system that is 12 volt negative ground. The Tiger has been highly successful on marine engines (inboard and outboard); stationary engines for compressors, etc.; motorcycles, trucks, farm tractors and self propelled implements. The same Tiger fits them all.

Warning: The Tiger SST is not a cure-all or mechanic. The Tiger will not repair broken wires, slipped timing, broken rotors, broken caps, cracked spark plugs, burned wires, flat tires or transmissions. For best results the plugs, points and plug harness should be checked to be sure they are in good condition.

WHAT IS A TIGER?

The Tiger is a solid state electronic device consisting of transformer, transistors, capacitors, diodes, resistors and SCR mounted on a fiberglass PC board. The entire assembly is housed in an extruded aluminum heat sink. Because **all** of the components are enclosed, the Tiger is weather proof. The Tiger is **not** mechanical and has **no** moving parts. It **DOES NOT** take the place of anything on the engine. It is an accessory which works best with the standard coil, distributor and spark plugs recommended by the car manfacturer.

The Tiger can be easily installed in ten minutes—absolutely **no** rewiring. The engine or Tiger **cannot** be damaged by improper installation. It will not interfere with car radio, CB, or tape player. Same unit fits all vehicles. The unit is 4½ x 5¾" and weighs only 2½ pounds. The Tiger has a dual ignition switch which permits use of either Tiger or standard ignition. The main purpose of the switch is to permit motor work or tune-up check to be done with current standard shop equipment.

GUARANTEE

TRI-STAR CORPORATION warrants to the original purchaser, the TIGER CAPACITIVE DISCHARGE IGNITION to be free from defects in material, workmanship and operation for the life of the vehicle on which it is originally installed.

Any unit which shall operate improperly will be repaired or replaced by TRI-STAR CORPORATION if returned to TRI-STAR CORPORATION, P. O. Box 1727, Grand Junction, Colorado, 81501, accompanied by the customer portion of the warranty-registration card. The return should be accompanied by a $1.00 service charge to defray postage and handling if the unit is more than 1 year old.

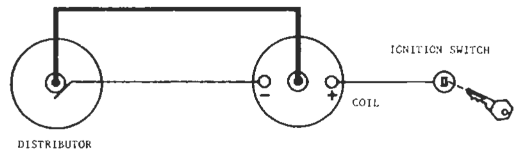
TRI-STAR CORPORATION'S liability shall be to repair or replace any material or unit found inoperable and returned by the original owner. This guarantee does not apply to units which have been damaged by misuse, abuse, modification, alteration or improper installation.

This guarantee is the sole applicable guarantee and cannot be modified by any other agent except by written authorization of an officer of TRI-STAR CORPORATION.

Tri-Star Corporation

Phone (303) 243-5200 P. O. Box 1727, 730 Independent Ave., Grand Junction, Colo. 81501

WIRING DIAGRAMS



CONVENTIONAL IGNITION

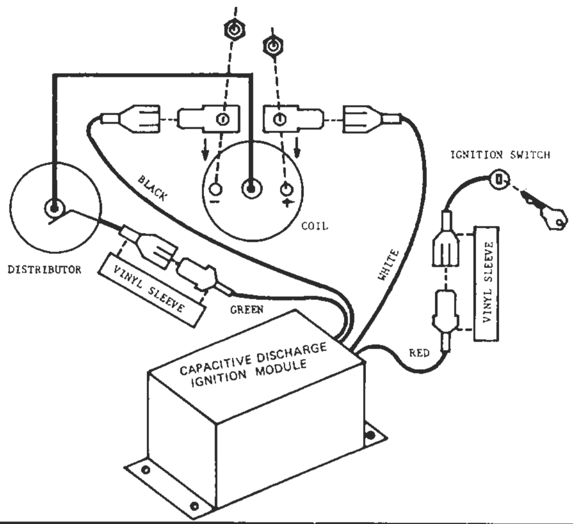


Figure 1.

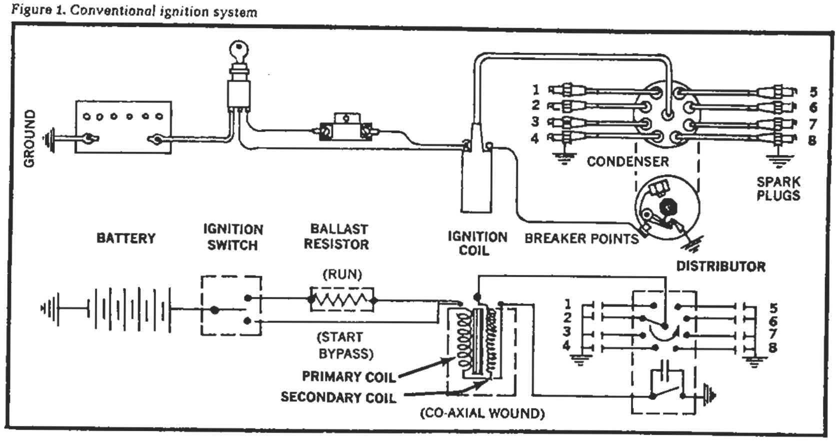


Figure 2. OPEN CIRCUIT OUTPUT - Secondary Voltage

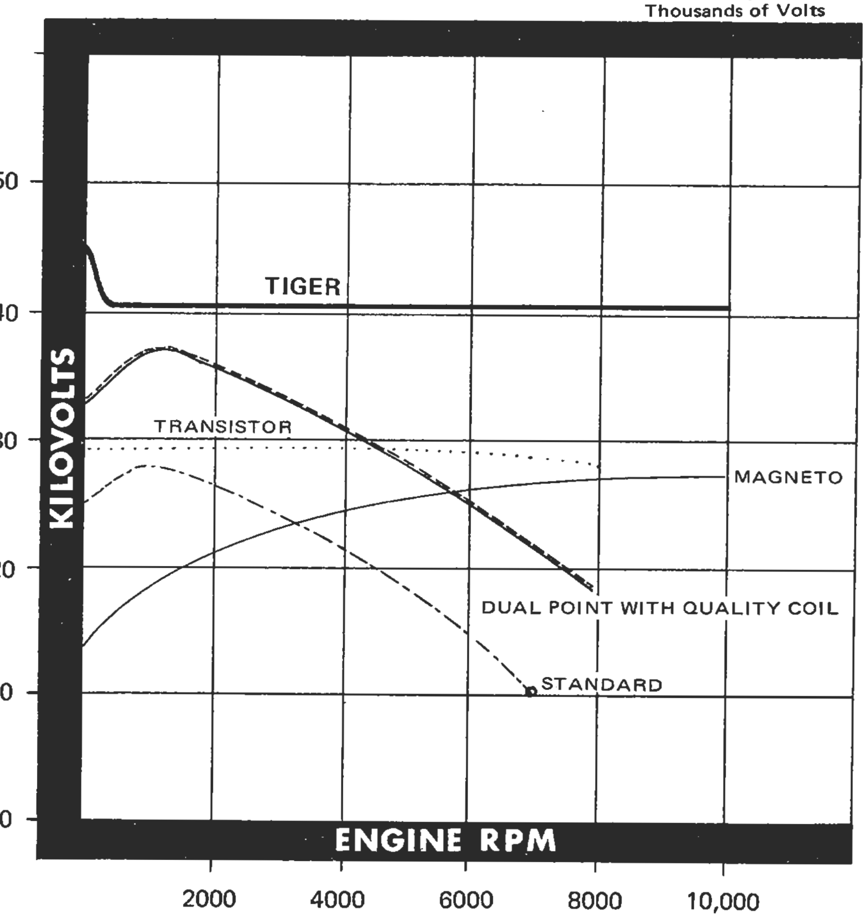


Figure 3. RISE TIME — VOLTAGE BUILDUP

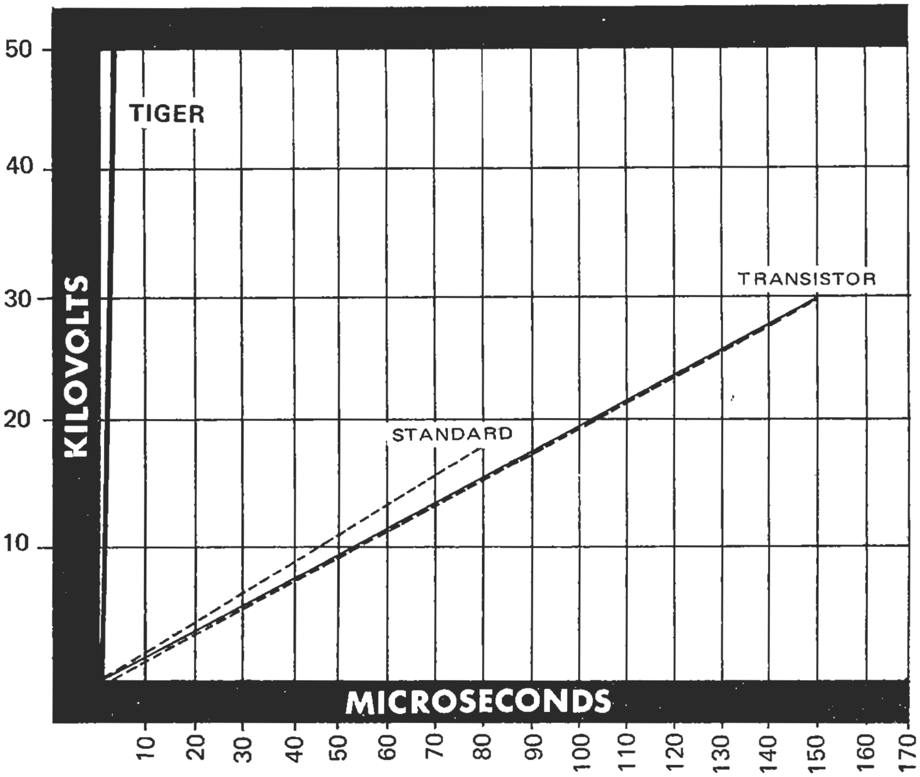


Figure 4. REQUIRED AVERAGE INPUT - Primary Circuit

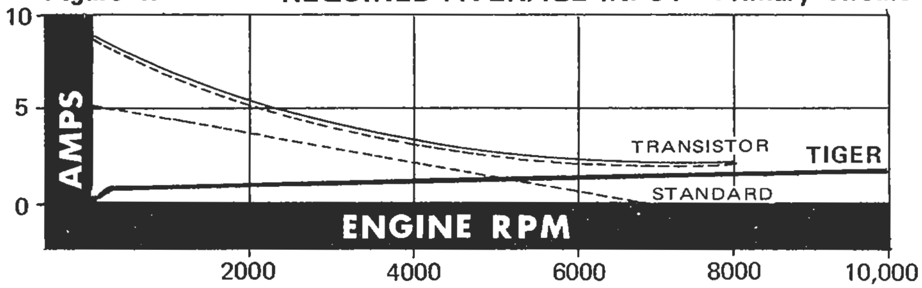
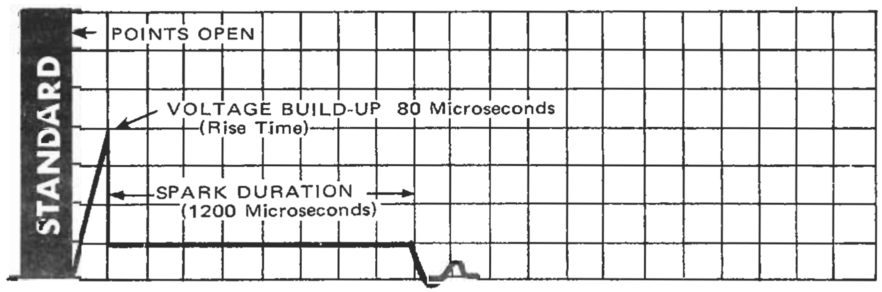


Figure 5. SPARK DISCHARGE CHARACTERISTICS



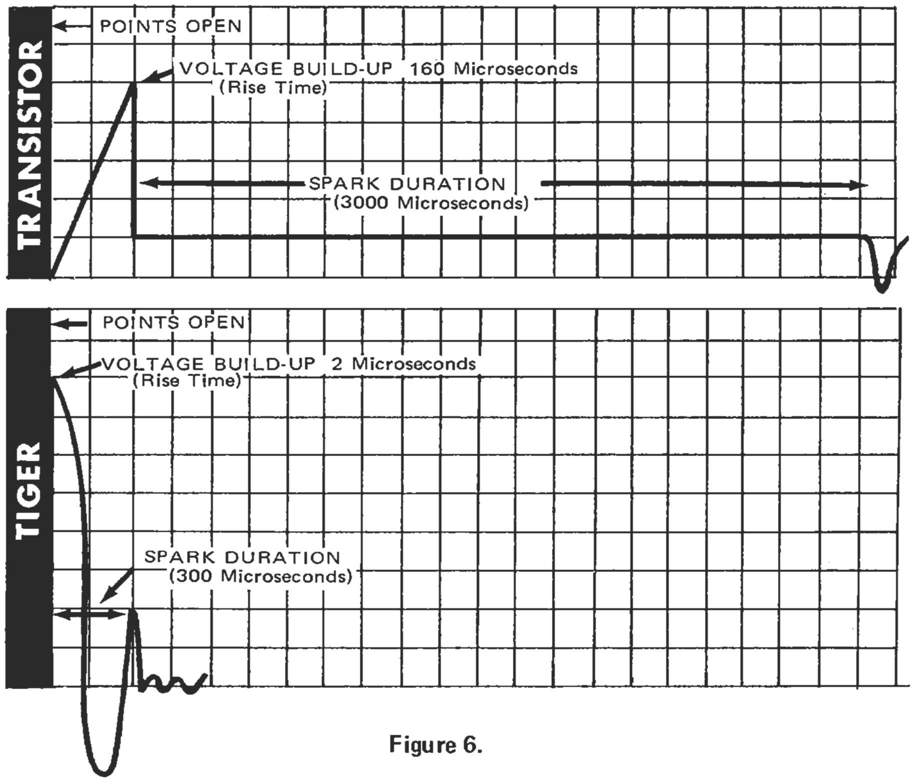
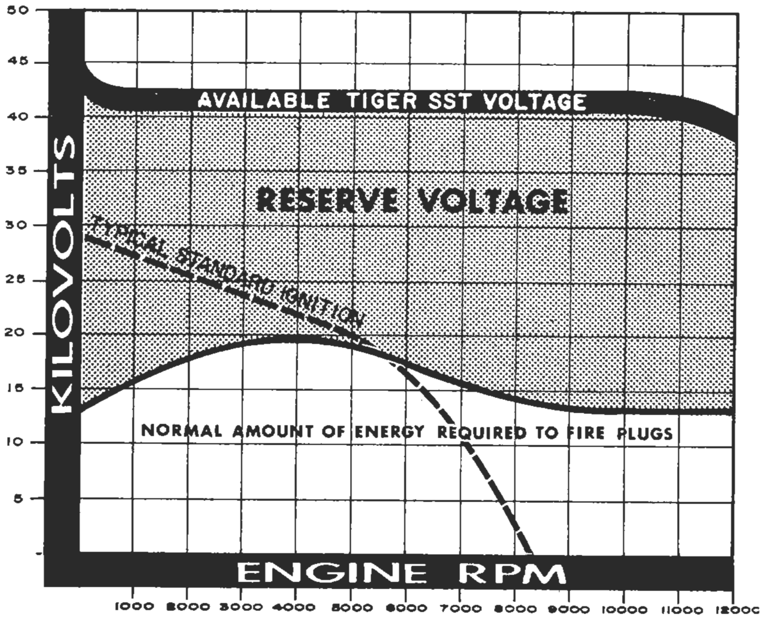


Figure 6.



A new improved ignition system for cars

Modern silicon controlled rectifier systems using latest techniques now on the market, approved by auto makers, are offered as optional equipment as well as for the replacement market

Six years ago, the first capacitive discharge ignition system using a silicon controlled rectifier was offered automobile owners. Although this early model had a number of faults, it did improve engine performance, and rapidly superceded the earlier transistor systems. Field experience with many thousands of these first systems has pointed out the hazards to efficient performance and lack of reliability of the early designs. It has also become apparent that new materials, techniques and products are now available which make modern generation CDI systems much more reliable and efficient.

Advance of Capacitive Discharge

Automotive engineers generally favor the capacitive discharge system, and it is currently being offered as optional equipment on high performance cars. The outboard engine and motorcycle manufacturers also recognize the demonstrable advantages of the fast rise time and high energies available, and are introducing CDI systems on increasing numbers of models as rapidly as possible.

This revolution in the ignition field has taken place as simpler and more efficient designs have become available. It is becoming more and more apparent that new engines require more efficient ignition, and that the most economical method is the modern silicon controlled rectifier type capacitive discharge unit.

Developed SCR Ignition System

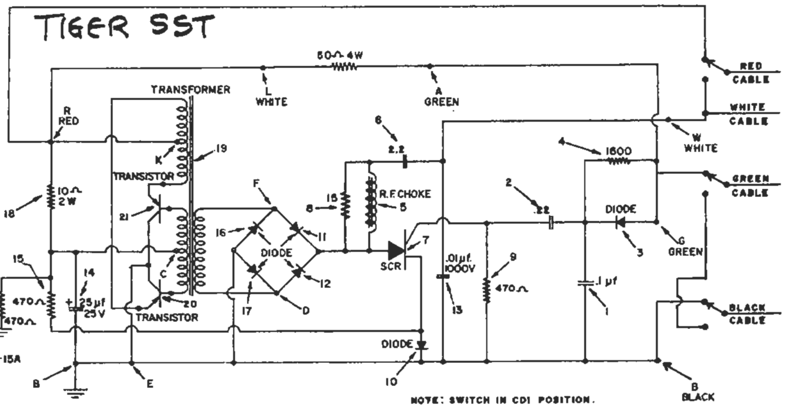
The will-'o-the-wisp dream of a high energy, easily controlled and efficient ignition has been pursued by automotive engineers since the first use of the Kettering inductive system in 1914. Engines have become more powerful and compression ratios have been increased, requiring ever higher voltages and currents, until the breaker points on late model cars operate at such high current densities that their life expectancy is very short. And at best, ignition is marginal. Now, a final solution to this problem has been found; simple, inexpensive, efficient and production-available.

All scr capacitive discharge ignition systems operate on the same basic principle, although the circuitry and methods of operation may differ. The following is a description of an advanced, current design, and the method of operation.

The Tiger system contains the usual dc to dc converter (in unusual form), storage element (capacitor), switching scr, and associated trigger and control circuitry. It uses the standard coil supplied on the automobile, and can be installed in 10 minutes or less.

The applied battery voltage (see schematic fig. 2) is converted to approximately 400 volts from a nominal 12 volts by the converter circuitry (2 transistors and transformer). This converter operates as follows: the battery voltage is applied to the transformer center tap (K) causing current to flow through resistors 15, 15A and 18, and simultaneously through the two transistors, Since the two transistors are not equal in resistance, one half of the winding will have a higher current flow.

Assuming that the lower half of winding (K) carries slightly higher current than the



A silicon controlled rectifier is the switch in this capacitive-discharge ignition system. The transistors are the d-c to d-c converter with capacitor C6 the storage element. The transformer (ignition coil) is not shown.

---

upper half, the voltages developed in the feedback winding (C), tend to turn-on the upper transistor (21), and turn-off the lower (22). This increases the current through the lower half of the transformer winding. The increase in current further drives the upper transistor into conduction and the lower transistor into cut-off. Such action simultaneously transfers energy to the secondary of the transformer, and this energy is rectified by diodes 11, 12, 16 and 17. When the current reaches a value that can no longer increase, due to the saturation resistance of the transistor, the feedback signal applied to the transistor decreases, causing this transistor to increase resistance. The decreasing current causes a reversal of the applied feedback signal turning-off this transistor, and turning-on the lower transistor, again supplying power to the secondary. Once this action is started, it continues at a rate of approximately 8000 Hz. Resistor 18 is the base current-limiting resistor, 15 and 15A supply starting bias.

A major drawback in the earlier CDI designs was employment of much lower frequencies which cause undesirable noise in an auto's sound amplifiers. The higher frequency used on the Tiger SST removes the problem of feedback of inverter signal through the battery impedence and into the radio or stereo system.

Voltage developed in the transformer secondary is rectified by the diode bridge and charges capacitor 6 through the coil primary windings connected to the output terminals. The capacitor is charged immediately whenever power is applied by turning-on the ignition switch.

At this time, let us assume the breaker points are closed. The battery voltage applied in this situation not only supplies power to the converter; a portion of the current also flows through the series connected 10 ohm resistors (22, 23, 24) through the points and to ground. This current, (approximately 400 milliamperes) supplies the gate signal to the scr through the following sequence: When the engine is cranked and the first cylinder reaches the position at which the spark plug should fire, the points open. The current flowing through resistors now flows through diode 3 to capacitor 2, driving the gate positive, and turning the scr on. With the scr turned-on the energy previously stored in capacitor 6 discharges through a loop consisting of capacitor 6, scr 7, diode 10 and the ignition coil. The applied coil voltage increases to the same level as the voltage stored in capacitor 6 in a period of approximately one-tenth microsecond. This current flow continues until the voltage across capacitor 6 approaches zero.

In the circuit made up of capacitor 6, scr 7 and the coil, capacitor 6 and the coil form a resonant circuit. The "flywheel effect" of this circuit maintains the current flow in the same direction, which causes a reversal of the charge in capacitor 6, charging it in such reverse direction to approximately 300 volts. This occurs since the transformer appears in the circuit as a relatively large parallel inductance.

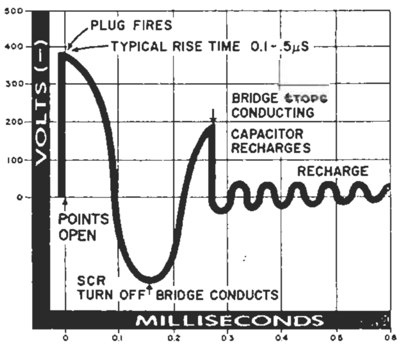
When the voltage in the capacitor can no longer rise from the "flywheel effect," the current attempts to reverse. This returns the scr to its off position. The reversed current flow simultaneously turns on all the bridge diodes, and the capacitor recharges through these diodes toward its normal state. The inverter completes the recharge, replacing only the energy used in the external load (coil).

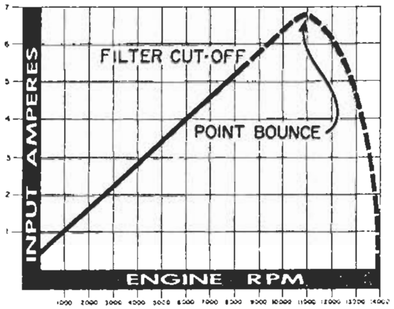
Since the original CDI design efforts, much more efficient core materials for the transformer have become available. The Tiger SST, utilizing these materials, which require considerably less copper in the windings, becomes far more efficient. The power supply is capable of delivering full energy to the capacitor at speeds of well over 10,000 RPM—far beyond the capability of any known internal combustion engine. The inverter has adequate time to recharge the capacitor, and the system operates using the same ballast resistor used in the standard Kettering system. Thus, there is no need to alter any wiring in a vehicle when installing this advanced CDI system.

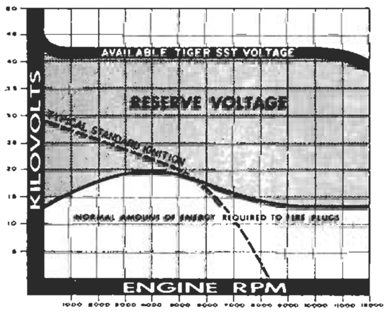
Increased Spark Repetition Rate

Previous CDI designs, in which the inverter operated at frequencies of a lower range, required that the inverter change frequency as engine speed increased. This method of operation had inherent problems since certain engine rates correspond directly to the frequency or the multiples of the frequency of the inverter. Inverter ripple resulted in the reduced effectiveness of the triggering circuit, and in some cases, caused sync miss. In the

How the Tiger performs . . .







the Tiger SST, the repetition rate of the inverter is much higher; even at the highest engine speeds, the inverter has many cycles in which to recharge the capacitor so a synchronization of the spark rate and the inverter cannot occur.

Point Problem Eliminated

One difficulty with Kettering-type systems results from a phenomena commonly known as "point bounce." Since, at higher engine speeds, the breaker points are moving at very rapid rates, as they close, they have a tendency to "bounce" open, thus delaying the recharge of the magnetic field in the ignition coil. This results in substantial loss of energy at higher engine RPMs. In the Tiger SST system, the inverter immediately recharges the capacitor—even before the points reclose. Energy cannot be degraded by any action of the points. It is possible, however, if the points were to reclose and reopen due to point bounce, that the unit would be called upon to supply energy which, in the actual combustion process, would not be necessary. To prevent this occurrence, capacitor 1 and resistor 4 serve as a time-constant, delaying the firing of the scr until the points have been closed for a definite period of time. This delay is approximately 1 millisecond, much longer than the period of point bounce. Such delay removes the possibility of refiring until the points have been actually mechanically closed and reopened by the distributor cam at the proper moment. A decided advantage to high performance engines is evident. Even in cases of a distributor in poor condition, the ignition will operate properly.

Protective Circuitry

Although the scr is an excellent switch at normal temperatures, it exhibits certain characteristics at temperature extremes which could be quite detrimental to efficient engine operation. It is necessary, therefore, to correct these deficiencies through other components associated with the trigger circuitry, Silicon-controlled rectifiers, when reverse biased, exhibit much faster turn-off times, resulting in a substantial increase in break-over voltage. Previous designs obtained this reverse bias by floating the cathode above ground and supplying the bias voltage from the battery supply. The Tiger SST utilizes an entirely different approach which allows grounding of the coil primary and improves stability, since the bias voltage is positively controlled. Bias is obtained in this circuit by current supplied through resistor 15 across diode 10. Since the voltage drop of the silicon diode is approximately 6/10 of the volt, the cathode becomes positive in relation to the gate which is returned through resistor 9 to ground. This negative bias assures absolute turn-off stability. With this method of bias, the possibility of damage to the circuitry as a result of external short circuits is completely removed. The time-constant associated with capacitor 2 and resistor 9 is such that the charge time of capacitor 2 is only a small fraction of the ringing frequency of the coil; thus, no provision need be made for discharge of this capacitor in order to prevent refiring. The R F choke 5 reduces DIDT (rate of change of on-state current) applied to the scr to a fraction of its allowable rating; this protects the scr against DIDT damage. Resistor 8 is a damping diode for this choke and damps the ringing to further assist in prevention of damage due to high DIDT. Capacitor 13 serves as a bypass for high-frequency components which may be induced in the external firing circuit and prevents damage to the scr and bridge diodes from the external high voltage transients which could occur from the secondary spark.

Coils & Rise Time

Rapid rise time in the secondary spark is of primary importance. The more rapidly the voltage rises to the point of firing, the less energy is dissipated by fouling resistance, a condition associated with even a clean spark plug. Since the trigger circuitry in the Tiger SST has an extremely rapid rise to the gate of the scr, the scr is turned-on in a fraction of the time of other systems, thereby increasing the rate of rise in the secondary, and reducing the heating effect caused by slow turn-on of the scr.

Coil Design

The fast rate of rise gives a rise time to fire with a standard coil of approximately 3 microseconds or 10 to 15 times faster than performance of the same coil when used in the Kettering system. Further, since the coil is used only as a transformer, heating effects are greatly reduced and coil life considerably lengthened.

Although many experiments have been conducted with regard to special coils, these studies have shown that the increase in efficiency brought about by special coils is so small that the additional expense is unjustified. The same tests proved that the standard coil supplied with the automobile is more than adequate.

General Parameters

Experience with many thousands of units of a previous design has dictated the circuitry in the Tiger SST which basically differs as follows:

1. The use of a ferrite transformer core with high permeability and high saturation flux density, has increased the efficiency of the inverter substantially. It further allows the handling of higher power levels which enables the Tiger SST unit to operate and deliver full voltage at any useable engine RPM.

2. The new trigger circuitry increases the efficiency of the scr substantially since it is switched through the transistor region much more rapidly than in previous designs. This results in a substantial reduction of heating effect in the scr and provides much higher reliability.

3. The method of obtaining bias for scr turn-off is much more controllable and removes the possibility of damage in installation which could be caused by improper connection.

4. The reduced number of components materially reduces the probability of failure and permits the use of components providing higher safety factors, because of the additional space available on the circuit board.

5. Assembly time is decreased for consumers using the kit form, because with the reduced number of components, all parts can be located on one circuit board and no interconnection jumpers are needed.

Packaging

Ignition systems often are exposed to environmental conditions not necessarily suitable for electronic-type equipment. They must withstand vibration, moisture, high and low temperatures and, in certain cases, voltages which are not properly controlled by the alternator or generator system. These requirements must be taken into account in proper design of the final package.

The Tiger SST system is housed in an special extruded aluminum case, which provides several unique features: The transistors in the inverter section are more efficiently cooled than in comparable designs, since heat is extracted from both the normal mounting base and the transistor top. This makes it possible for the transistor to dissipate substantially higher power.

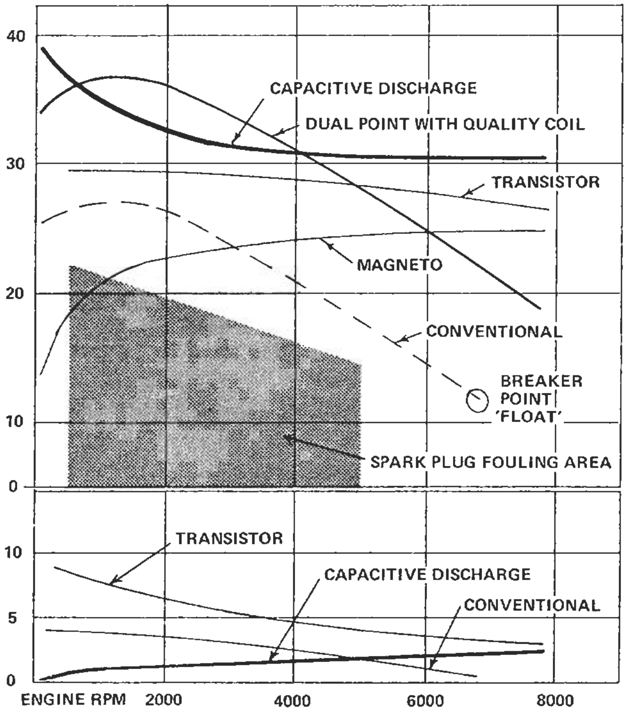
The resistors associated with the trigger circuit dissipate a large portion of the remaining heat. It is diverted into a heat sink, since the resistors are inserted in a cavity which is an integral part of the extrusion. This intimate contact reduces the operating temperature of the resistors, and at the same time, removes the requirement that such heat be transferred by convection inside the heat sink.

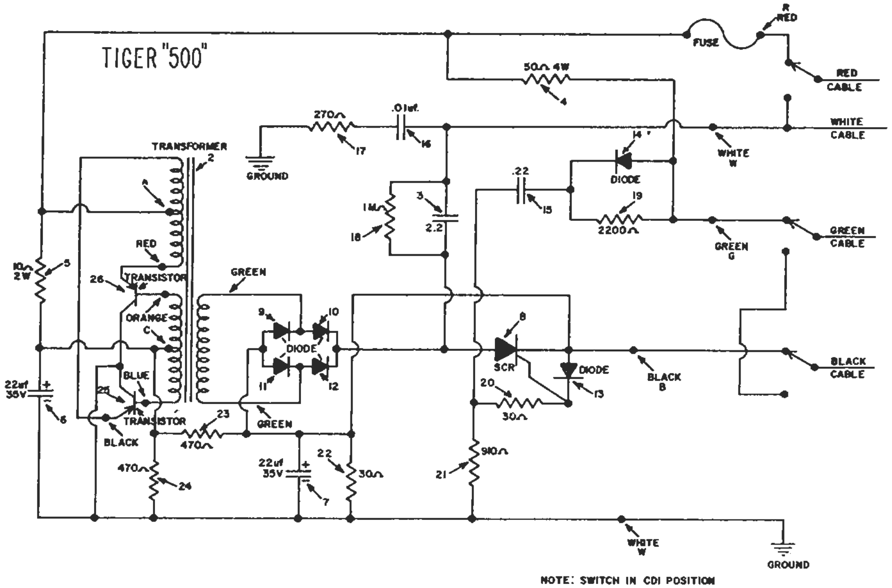
Last, and quite important, by mounting the transistors internally in the heat sink, the only external opening is that required to run out the connecting wires. The system thereby can be readily water-proofed, making it suitable for installation on boats and other vehicles in exposed areas, where other designs would be impractical or totally inoperative.

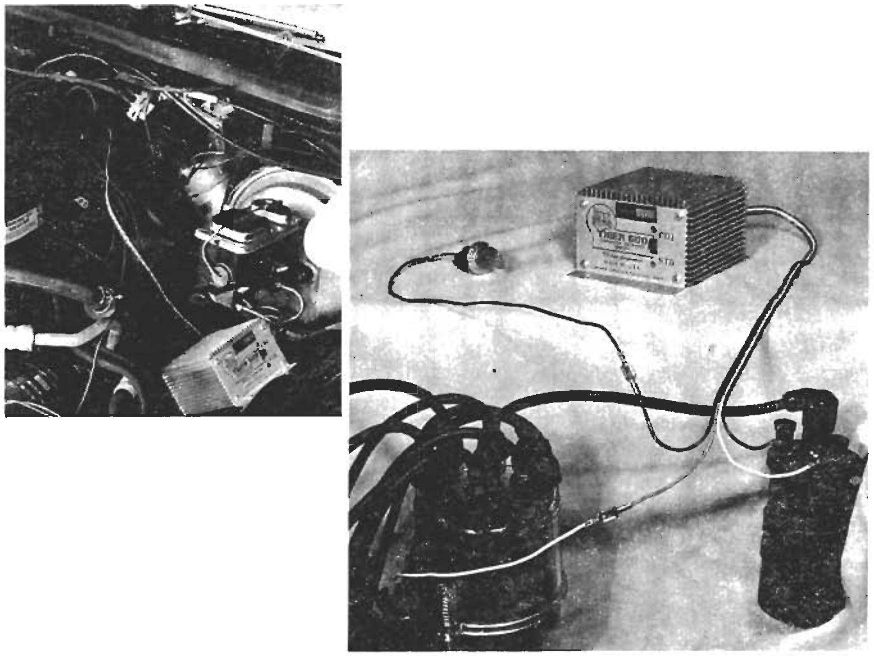
Conclusion

By employing modern materials and design concepts, it has now become practical to produce an inexpensive, extremely efficient, reliable capacitive discharge ignition system which meets all requirements for a high energy system and which may be installed on any vehicle very easily, with no modification of the required basic wiring.

Comparison of required input primary current and open-circuit output secondary voltage for various ignition system







Do-it-yourself: installation time is less than 10 minutes, without additional components or rewiring needed. Procedure: remove the wires connected to the ignition coil, attach two terminals.

Design Requirements

The following items were specifically designed into the system in order to remove problems with earlier versions.

· The inverter frequency should be as high as possible compatible with transistor switching times and reasonable losses. This will avoid inverter feed through into radios and stereos and reduce inverter effect on triggering of the SCR. Trigger wave forms should be as sharp as possible in order to reduce SCR heating effects. Inverter must operate at full load from −45 F to 200 F.

· Circuitry should be as simple as possible with no "crutches" in circuitry which are not predictable.

· Method of connection must be such as to allow reconversion to standard ignition with absolutely no tools.

· Heat sink design must be such as to allow for complete water proofing and more adequate area for component cooling.

· All components must operate well within rate of design and all critical components to have at least 25% safety factor.

· Assembly should be simple, straight forward and within the capability of a person with no prior knowledge.

· Design must be such that it is immune to damage by inadvertent mis-connection or improper use of test instruments.

CERTIFIED CDI LABORATORY TEST

December, 1972

MANUFACTURER	COST	WARRANTY	POWER LOSS WATTS IDLE (Note 1)	MAX RPM (Note 2)	FOULED PLUG LOAD (Note 3)	SPARK DURATION (T) (Note 4)	MAX RPM NO BALLAST (Note 5)	CHANGE OVER SWITCH	LOW TEMPERATURE VOLTAGE - 20°F (Note 6)	ENERGY (JOULES)	PEAK SPARK CURRENT (I)	PEAK POWER RATIO (Note 7)
Tiger SST	39.95	Life	10.64	7500	150K	310	12,000	Yes	4.7	.15	.12	.55
Tiger 500	49.95	Life	8.4	9000	150K	350	12,000	Yes	3.6	.15	.175	.91
Mark 10-B	59.95	1 Yr.	14.0	10500	150K	250	10,500	Yes	5.0	.086	.10	.37
Mark 10	44.95	1 Yr.	10.92	6300	200K	250	7,500	No	6.0	.09	.12	.47
EDX	89.95	Life	2.8	7500	200K	250	10,500	Yes	6.0	.11	.11	.41
Cragar	69.95	1 Yr.	11.2	7500	150K	260	12,000	No	3.6	.12	.12	.45

Note 1. (Power Loss) Input volts (14 volts) multiplied by input amperes = watts, unit untriggered.

Note 2. (Maximum RPM) Maximum RPM obtainable without misfire 14 volts input, .5 ohms resistance in series with input power.

Note 3. (Fouled Plug Load) Minimum resistance shunting a 15 kilovolt gap which allows consistant firing at 3600 RPM, 8 cylinder engine.

Note 4. (Spark Duration) Total time in microseconds spark exists across a 15 kilovolt gap, measured in the secondary of the coil.

Note 5. (Maximum RPM, no ballast resistor) Maximum RPM obtainable with no misfire, 14 volt input, no series resistance in input power.

Note 6. (Low Temperature Voltage) Minimum voltage to fire a 15 kilovolt gap at -20° F.

Note.7. (Peak Power Ratio) Determined as PPR = EIT.

E = 15 kilovolts

I = Peak spark current (amperes)

T = Spark duration in microseconds

The foregoing is a true and accurate account of tests run December, 1972

MESA COLLEGE
Grand Junction, Colorado

By ______________________
DIRECTOR OF OCCUPATIONAL STUDIES

By ______________________
AUTO MECHANICS INSTRUCTOR

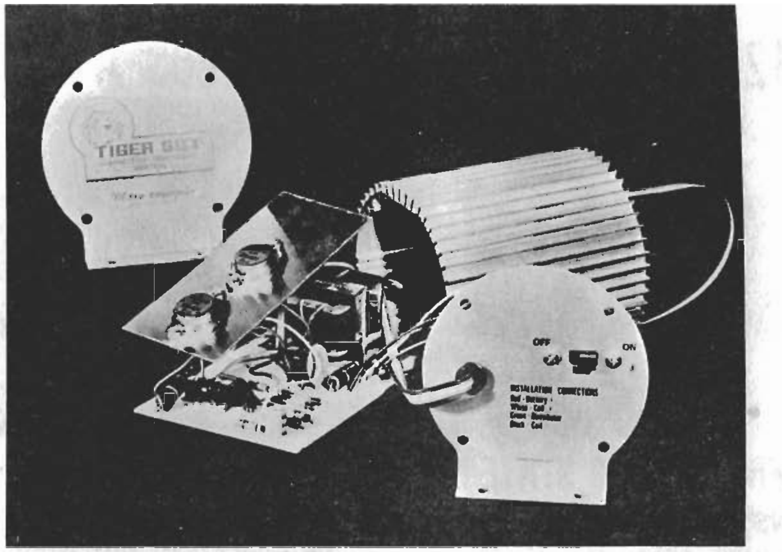
By William M. Tyler
AUTO MECHANICS INSTRUCTOR

State of Colorado
County of Mesa
SS

Subscribed and sworn to before me this 3rd day of January, 1973.

____
NOTARY PUBLIC

My commission expires 9/20/75.



TIGER SST C D TECHNICAL DATA

Input Voltage:	12 Volt nominal negative ground system with either generator or alternator.
Triggering Source:	Breaker points or any other suitable source.
Input Amperage:	.6 to 6 amperes depending on RPM; 1 ampere at normal speed.
Output Pulse:	.5 microseconds rise to peak.
Available Power:	.15 joule per pulse.
Spark Duration:	310 microseconds.
Minimum Firing Voltage:	4.7 Volts.
Available Output Voltage:	Cranking - 8v, input 30,000 Volts. 500 RPM - 12v, input 45,000 Volts. 7500 RPM 12v, input 40,000 Volts.
Peak Spark Current:	.12 Amp
Peak Power Ratio:	.55

Switch is two position with gold-plated contacts.

Size: 4½" x 4½" x 5¾" — 2 pounds

ASSEMBLED — READY TO INSTALL

Unit warranted free of defects in material workmanship and operation for as long as you own it!

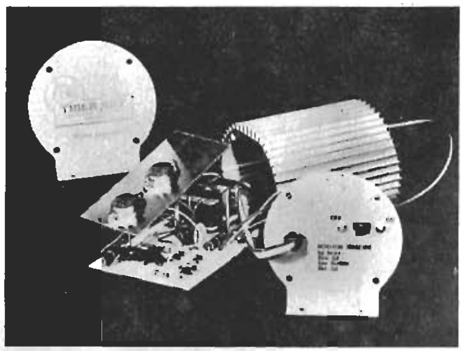
(Postage Paid) — EACH $42.95

SIMPLI-KIT

All parts, solder, programmed step-by-step assembly instructions. All parts warranted free from defects for 90 days.

(Postage Paid) — EACH $31.95

12 REASONS YOUR CAR NEEDS A TIGER



TIGER-CD SOLID STATE IGNITION SYSTEM

* INSTANT STARTING IN ANY WEATHER — COLD OR HOT
* ELIMINATES 3 OUT OF 4 TUNE-UPS
* INCREASES GAS MILEAGE
* INCREASES HORSEPOWER
* IMPROVES ACCELERATION AND PERFORMANCE
* EXTENDS SPARK PLUG & POINT LIFE
* REDUCES ENGINE MAINTENANCE EXPENSE
* AMPLIFIES SPARK PLUG VOLTAGE TO 45,000 VOLTS
* MAINTAINS SPARK PLUG VOLTAGE TO 10,000 RPM
* REDUCES EXHAUST EMISSIONS
* DUAL IGNITION SWITCH
* UNCONDITIONAL GUARANTEE FOR ORIGINAL OWNER

  — INSTALLS IN 10 MINUTES ON ANY CAR WITH 12 VOLT NEGATIVE GROUND — NO REWIRING —

  — MOST POWERFUL, EFFICIENT AND RELIABLE ELECTRONIC IGNITION MADE

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TIGER CD

CAPACITIVE DISCHARGE IGNITION

THE SOLID STATE ELECTRONIC IGNITION SYSTEM FOR ALL VEHICLES

Tri-Star Corporation