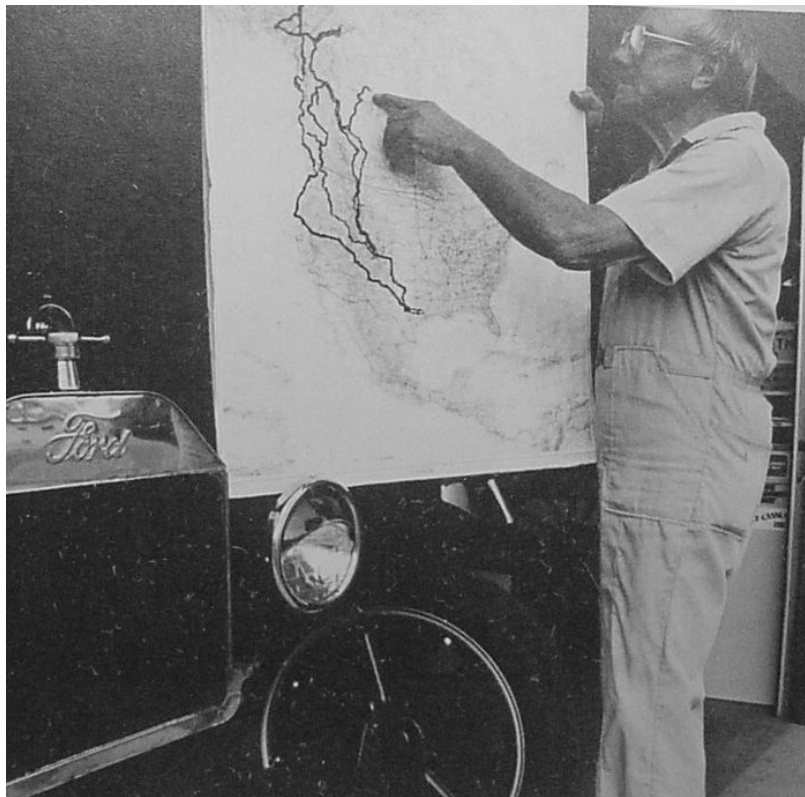


Montana 500 Newsletter

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Montana Cross Country T Assn.
1004 Sioux Road
Helena, MT 59602

www.montana500.org

2005 Officers and Directors:

President: Rick Carnegie

Vice President: Mark Hutchinson

Sec.-Treasurer: Janet Cerovski

Directors:

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Tom Carnegie 2008

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Tony Cerovski 2008

Gary Ebbert 2006

Mark Hutchinson 2007

Doug Langel 2006

Mike Robison 2006

Nan Robison 2008

Meeting Secretary: Jillian Caples

Correspondence and newsletter: Tom Carnegie

Membership dues \$10.00

Touring class: \$25.00

Endurance runner: \$35.00

Cover photo: H.H. "Hal" Wilson of Colorado. Hal recently passed away. Please see article later in this newsletter. Photo from Model T Times.

Editor's Message

Rick has picked the Comfort Inn as the base hotel this year. Below is information I have copied from the company's website. It is my understanding that they have RV parking.

Comfort Inn (MT418)450 N. Interchange , Dillon, MT, US, 59725

Phone: (406) 683-6831 Fax: (406) 683-2021

The Comfort Inn® hotel is conveniently located off Interstate 15, just one mile from the **Beaverhead County Museum**. This Dillon hotel is minutes from the **University of Montana-Western**.

Guests of this Dillon hotel will enjoy amenities like the **free expanded continental breakfast**, **free local calls** and **free coffee**. After a long day on the road, be sure to take advantage of the **indoor heated pool** with adjoining **sundeck**. This is a **pet-friendly hotel**; a nightly fee applies.

Business travelers will appreciate the **meeting room** that accommodates up to 20 people for most events and business functions. Access to **copy** and **fax service** is also available.

Kick back and enjoy a movie on HBO, located in all guest rooms. **Pizza**, **popcorn** and a **few cold deli items** are available in the **hotel's mini-kitchen**. In addition to standard amenities, some rooms include **refrigerators** and **microwaves**.

Staying a while? The hotel offers laundry facilities for guest convenience. The **hotel's information kiosk** lets guests know what's available in the area. Truck parking is located on the property.

The hotel also offers a **100% Satisfaction Guarantee**. What are you waiting for? Come stay at the Comfort Inn hotel and experience an inn-credible time in Dillon.

Tom Carnegie - newsletter editor

President's Message

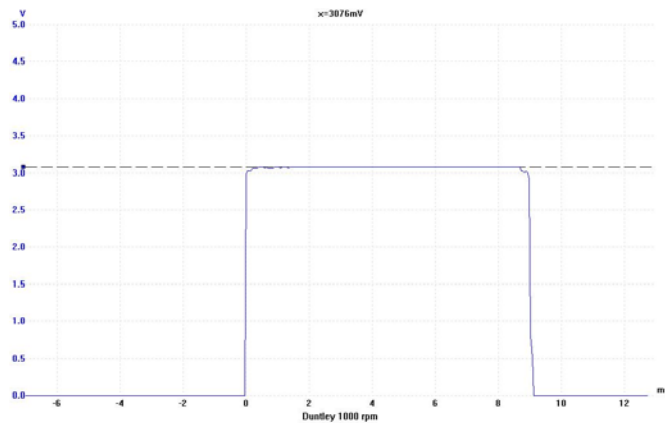
(this space reserved for president's message)

A Poor Man's Oscilloscope By Tom Carnegie

In order to better understand the function of a model T timer it is useful to look at its operation with an oscilloscope. A good deal of money can be spent on an oscilloscope, but there are reasonable alternatives. With a bit of poking around, one can find circuits and software to convert your existing PC into a decent oscilloscope. I chose instead to buy a commercial unit that plugs into the parallel port of the computer. The unit I got was manufactured by Pico and was less than \$100.00 including the software at the time of this writing. The model number was ADC-10. It has some limitations as an oscilloscope, but is quite ideal to test the switching properties of a timer.

Job Description

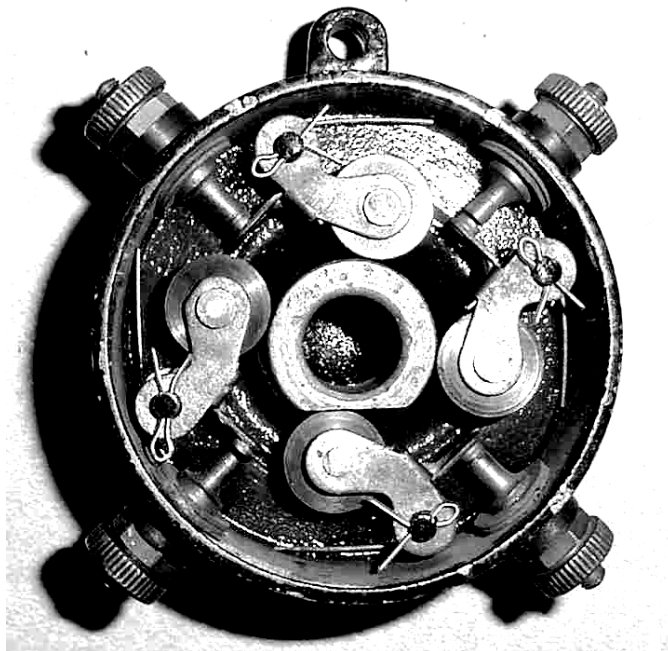
The job of the model T timer is to ground the coil for each cylinder at such a time as to allow the plug to fire and ignite the fuel in the combustion chamber. The model T timer is essentially a single-pole four-throw switch. In a perfect world a switch would either be on, or off. In the real world it never happens quite this way.



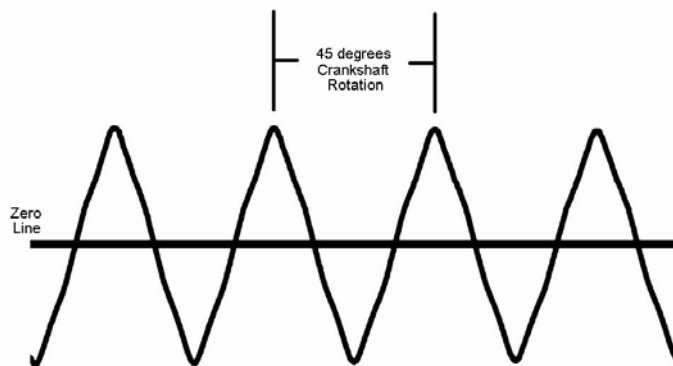
The perfect model T timer would not only turn perfectly on, then off, it would do it at exactly 90-degree intervals over the range of rpm's that the engine operated. The previous picture shows a nearly ideal waveform for a Model T timer. It is from a Duntley timer, turning at 1000 rpms. *To clarify, in this article in regard to degrees or speed, unless otherwise stated, I will refer to timer rotation as opposed to crankshaft rotation. The timer rotates at 1/2 crankshaft speed, therefore all speeds and degree figures for the crankshaft are twice that of the timer.* The timer also needs to dwell in the "on" position for a certain amount of time. This dwell period is not too critical as long as it is adequate. I will explain better later on.

Solid Ground

There are basically two ways in which mechanical (non-electronic) timers function. Most timers are what I call the "wiper" kind. The way they operate is to have a wiping contact that is connected to the camshaft. This wiper then contacts a commutator that is wired to the coil box. In the second kind, the commutator is self-grounding and the cam is used as a triggering device. Triggered timers have some advantages over wiper timers, but aren't allowed on the Montana 500. Wiper timers have at least two disadvantages. One is that the wiper is scooting across the commutator contact. It never really makes a solid connection, but rather arcs and sparks its way across the contact surface. Two is that the wiper must get its ground through the camshaft, which is theoretically rotating on a film of oil. Some folks have said that there may be an advantage to using metal timing gears because the cam can then ground through the gears to the crank. That may be true, but the gear teeth should have an oil film on them and the crankshaft should also be riding on oil! Some other folks say that the timer brush (wiper) gets its ground through the tin shield that is used to hold the felt in place. Even so, it is still a wiping situation between the brush and the shield.

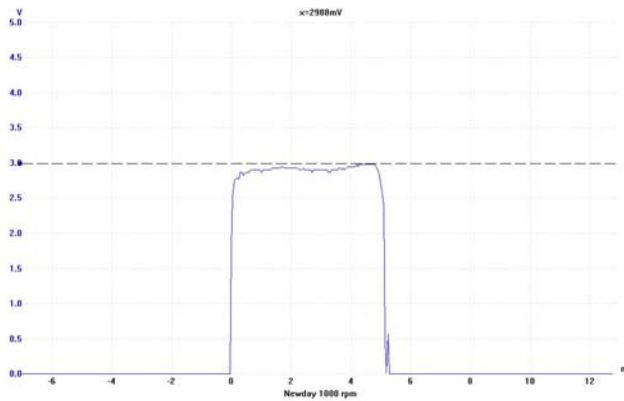


The above photograph shows a Duntley timer. The contacts ground through the case rather than through the camshaft.



Pictured above is a waveform from a Model T magneto. The highpoints of the waveform occur every 22.5 degrees of crankshaft rotation. Whether the highpoint points up or down from the center (zero line) is not important, either

pulse will energize the coil. The flywheel is indexed to the crankshaft in such a fashion as to cause the high point to occur at certain exact times. The useful times these pulses occur listed from retarded to advanced are: 4 degrees after TDC, 18.5 degrees BTDC and 41 degrees BTDC. Ron Patterson and Steve Coniff have written an article that goes into more detail on this subject. It can be found on the Internet at <http://www.mtfca.com/encyclo/ignition.pdf>. It should be noted that these timing figures apply only to when the car is running on "mag". When running on battery, the timing is continuously variable throughout the aforementioned range. Chiefly because six volts is not enough to properly energize a Model T coil, model T's don't run well on battery. As such this article will be confined to issues dealing with magneto operation. For every revolution of the timer there are thirty-two pulses from the magneto. Of the thirty-two pulses, twelve are useful, three for each cylinder. An ideally functioning timer would operate as a selector for these useful pulses. Even a less than ideally operating timer could be



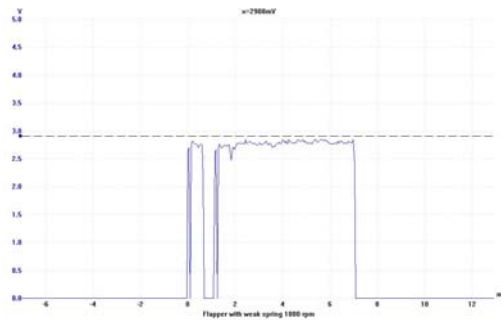
fairly adequate. Above is the waveform of a well functioning Newday timer. The dotted line shows the maximum that is possible for the timer to let through. Although the waveform is slightly ragged and doesn't come up to the maximum line, it is likely functionally equivalent to the Duntley timer shown earlier. As mentioned earlier, a timer must turn on then stay on

(dwell) for a certain amount of time. How long it dwells is not critical as long as at least one pulse of the magneto fires the coil. During a dwell phase, the coil could fire several times. The only important one is the first one. All subsequent firings during this particular dwell phase are redundant. So what is the significance of all this? The timer needs to turn on cleanly at the central timing point, (see side bar), which corresponds to the zero point of AC voltage generated by the magneto. If the timer doesn't turn on cleanly, the timing will be affected.

The graph below shows the results of a flapper timer with a weak spring. Depending on where your spark lever is set, this could have a minor, or significant impact on the spark function.

The timing is fairly stable at the useful points mentioned in the text. What exactly happens to the timing as the spark lever is advanced?

Starting at a certain point, which I will call the central point, as you begin to advance the spark lever, the timing immediately begins to *retard*. This retardation is logarithmic, so it is nearly imperceptible at first. As you continue to advance the lever, the retarding will accelerate in relation to the advancing of the lever. At a point in time as you continue to advance the lever, the spark will become unstable, then jump ahead in timing. As you continue to advance the lever the spark will now advance in a logarithmic fashion, fast at first, then slower and slower until it reaches the new central point, which is 22.5 degrees advanced from the old central point. As you continue to advance the lever, the timing will begin to retard and the cycle starts over again.



Hal Wilson
Tom Carnegie

Hal Wilson passed away recently. I knew him from when I ran in the Montana 500 the seventies. I will describe my first impression of him. I don't recall what year it was, but on this particular run his car was disqualified in the pre-race inspection because he had relocated his fuel tank underneath the dash instead of underneath the seat. At that time it was common to switch body parts around from year to year. His car had very early flat style fenders and a 1925 or so body. His thought was that since 1926-7 cars had their tank in the cowl, why not an earlier car? At some point in the pre-race meeting the drivers voted to overturn the inspectors' and directors' decision and allow Hal to run his car that year. I understand that Hal was a full-bird Colonel in the air-force and generally had the stoic demeanor fitting to the rank, but I could tell that he was affected by the show of support from the drivers. The next year another car was disqualified at the start and Hal stood up at the pre-race drivers' meeting and made a motion to allow this fellow to run. The motion passed. Hal and several other fellows from Colorado were quite involved in T road racing and formed their own race called the Colorado 500 that ran for several years in Colorado. Hal was known to drive his model T (usually a brass roadster) great distances. He liked to drive from Colorado all the way into Canada and into the Arctic circle, often on primitive roads. He had articles published in both the Vintage Ford and the Model T Times.

2006 RULES

Note: All cars that tour along must meet the rules flagged with a *.

Note: Newly adopted or changed rules in italics.

- 1 * Directors are responsible for interpretation of all the rules pertaining to the Association. Decision of the Directors is final.
- 2 * All cars must comply with Montana license and insurance requirements.
- 3 * No alcoholic beverages will be allowed in competing cars. Substantiated violation is cause for disqualification.
- 4 * Drivers performing in an unsafe or unsportsmanlike manner will receive 1 warning. Second infraction may result in disqualification upon review and affirmative vote of 2/3 of the remaining drivers.
- 5 Not more than two people are allowed per endurance car while under time.
- 6 * All drivers and relief drivers must be a paid-up member of the MCCTA.
- 7 * No tailgating of support or tour vehicles or any non-participating vehicles..
- 8 *All participating cars must have attached or placed directly on both sides a sign with name of sponsor or owner and hometown. Use three (3) inch letters preferred.
- 9 * All "T"s will be available for subsequent inspections at any time.
- 10 * All drivers and relief drivers must sign an Endurance Run waiver and Inspection Form
- 11 All T's must be assembled from stock parts and/or reproduction parts equal to stock specifications. Cars must have four fenders, splash aprons, runningboards, front splash apron, dash, and radiator shell and all replacement body parts must be made of metal, with the following exceptions:
- 12 * All competing cars must be equipped with two headlights and one rear stop/tail light in working order.

- 13 * Horn of any type in working order required.
- 14 * Rear view mirror of any type required.
- 15 * Emergency brakes must be in good working order.
- 16 Windshields must be stock for year of car. No altering. Must have safety sheet of safety plate glass top and bottom. Windshields to be completely closed and sealed.
- 17 * All transmission bands must be in good working order.
- 18 * Complete set of floorboards required.
- 19 Body parts must be stock for year of car.
- 20 * Padded seat and back rest of any type required.
- 21 Original turtle deck may be replaced by some type of substantially built box or turtle deck. Minimal length and width equal to size for stock turtle deck on that year of car, with floor, sideboards and endgate. Sides and end no less than six (6) inches high from the floor and made of no smaller than 3/4 inch wood.
- 22 Rebuilt radiators allowed. Must be built to stock dimensions including tanks and side brackets.
- 23 Gas tank must be stock for that year of car and mounted in stock position. Gas strainers allowed. Fuel line not to exceed 3/8" I.D.
- 24 * At least 36 inches of 1 1/2 inch exhaust pipe required, properly attached to and extending from the exhaust manifold.
- 25 Only stock cast iron or aluminum intake manifolds with ports not to exceed 1 1/8" diameter are allowed. New manufactured manifolds with ports not to exceed 1 1/8" are allowed. *No grinding or performance enhancing alterations of the intake or exhaust ports allowed.*
- 26 Oiling system options: One outside oil line *allowed. No modifications of the inside oiling system allowed.* Transmission oil screen allowed.
- 27 Only stock Ford roller type, New Day, Anderson flapper type timers or Crystal timers allowed. Ball

- or needle bearing rollers optional. Quick couplers NOT ALLOWED in timer wires. Internal timer material optional.
- 28 Rear ends must have 11 tooth pinion and 40 tooth ring gear. Ruckstell locked in high.
 - 29 * Body must be painted, color optional.
 - 30 Hoods are not required. *Tops of open cars, use of muffler, and fans are optional.*
 - 31 Holes must be drilled through the heads of the following bolts for braided seal wire: Left hand front head bolt, Right hand middle head bolt, Middle two small pan bolts, and a hole must be drilled through the threaded end of both bolts that fastens the carburetor to the intake manifold.
 - 32 Only NH swayback and/or Ford "F"swayback carburetors allowed. Must be complete including choke butterfly. The Association's .0710 inch gauge MUST NOT go through the carburetor.
 - 33 Modifications of venturi and throat of carburetors allowed as long as the Association's .0710 gauge does not pass. Carburetor must be complete including all butterflies, adjusting needle, and stock spray needle. Butterflies must be original size.
 - 34 No performance enhancing fuel additives are allowed. Cars must use straight automotive pump gas as fuel during the race time, starting with inspection and continuing until the end of the race.
 - 35 The top 3 cars will be torn down immediately following the last flag. Additional teardowns will be put to a vote of the Endurance drivers. Endurance drivers will vote to accept or reject items of question.
 - 36 The first, second and third place cars will be torn down by a panel of five inspectors appointed by the Board of Directors. None of the inspectors may be a driver of the car to be inspected. If a car is disqualified, the next place lower will be inspected, until three have been found qualified. An inspector who is the driver of the car coming up for inspection due to disqualification of another car will be

replaced by the directors with another inspector.
All inspectors must vote.

- 37 Chassis parts may be assembled from any year T parts.
- 38 Zerk fittings in place of oil and grease cups are optional.
- 39 Only Model "T" wire, wooden spoke or disk wheels allowed. May use Model "A" 21 inch wire wheel or 30 by 3 1/2" wire wheels.
- 40 Only stock Model "T" or Ruckstell rear-ends and axles with:
 - standard eleven tooth pinion
 - forty tooth ring gear
 - stock roller bearings

Options: Bronze or roller thrust washers. Neoprene seals.

- 41 Bolts on wishbone at rear of pan must be safety wired. Front wishbone accessory braces on pre-1920 cars allowed. Use standard wishbone sizes.
- 42 Shock absorbers are optional.
- 43 Use stock configuration spring sets with a minimum of seven leaves per spring set.
- 44 Use a group 1 six volt wet cell battery for magneto system back up, lighting lamps, running horn and starter. Six 1.5-volt dry cell batteries may be used in lieu of the above 6-volt battery.
- 45 Cylinder bore not to exceed 3.825" maximum or 3.750" minimum
- 46 Cast iron or aluminum pistons of stock Model "T" type required. Cast iron pistons must have a full set of .250" width rings in place. Aluminum pistons must have two (2) .125" width compression rings and one (1) 0.1875" width oil ring in place. Knurling of piston optional. Refer to Illustration for Piston Dimensions
- 47 There must be one stock piston, rod and cap assembly in the engine. Exceptions: Cap may be drilled for dipper, and grooved for oil. Choice of rod bolts and nuts optional. The other three (3) assemblies

- can be balanced to this one.
- 48 Rods must be Model "T" Ford script. Maximum center to center distance of 7.030" measured from center of rod journal to center of wrist-pin.
 - 49 Only Ford script high heads allowed with the following exceptions: No limit to amount of milling of mating surfaces; Removal of metal in combustion chamber may be done to allow clearance for shoulder of piston and head of valves. Refer to Illustration for Head
 - 50 The crankshaft must be Model "T" Ford Script with a stock stroke of four (4) inches. Chroming, hardening or grinding of journals allowed, not to exceed 1.250" maximum or 1.208" minimum diameter.
 - 51 Counter-balanced crankshaft not allowed.
 - 52 Valves: Stainless steel and swirl polished valves are optional. For all valves use a minimum stem diameter of 5/16", a maximum head diameter of 1.500" and seating face of 45 degrees. Use either pins or two piece keepers. Hardened valve seats are optional. Radiused, 45 degree or three angle seat grinds allowable.
 - 53 Use of offset key between crankshaft timing keyway and the crankshaft timing gear keyway is optional. Camshaft timing gear material optional. Camshaft gear may be drilled to realign camshaft pins for valve-setting purposes only.
 - 54 Any cam that doesn't require modification of the block may be used. Bearing bores must be standard size, no relieving of the bearing bores. Camshaft bearings and seal optional.
 - 55 Type of fourth main is optional.
 - 56 Type of band material optional.
 - 57 Gauges are optional.
 - 58 Design and use of water pump optional.
 - 59 "V" type belt and pulleys optional.
 - 60 Adjustable flat tappet lifters (push rods) of stock dimensions, stem oversize to 1/32" allowed.

- 61 Balancing of rotating parts is optional.
- 62 * Each car will come to a complete stop before starting at the timers direction.
- 63 Timing will begin as designated for each car whether or not the car is on the starting line. Starting times can be adjusted at the timer's discretion. If the timers recognize a beneficial savings in time, a lagging car may be sent out ahead of its designated time. Usually this will be discussed with the Directors ahead of time. Time will start for this car when it leaves the starting line.
- 64 Removal of head or pan while at stop (not under time) or on tour day will impose a time penalty of 1 hour. Report this infraction to the inspectors immediately. Removal of head or pan under time must be reported to the inspectors at the first opportunity for replacement of seal.
- 65 Changing the carburetor imposes a time penalty of 15 minutes. Report the infraction to an inspector immediately. Replacement carburetor must meet the requirements stated in the Inspection Rules.
- 66 Disabled cars will receive *slow time for each leg not completed, plus a daily penalty of one hour*. In addition, cars trailered in on the last day are not eligible for prize money or trophies.
- 67 Replacement of complete engine is cause for disqualification.