



## In a burn test these fibers will often shrink back away from the flame

Important: If you are on this page you probably have a Polaris with a bad speedometer which means you can't put it in 4 wheels and your reverse override doesn't work. If this happened to you, probably ran it without a good battery - or without battery at all: Read on to find out why you should never do it if you can help him! There are at least two versions of tachymeters used in the late 1990s and early 2000s - the one that, inside, resembles Figure 4 with "traphor" components. While both versions seem to have the same fate when used with a bad battery (or not) - and the "fix" is probably similar, I have not personally seen the latest version of surface-mounting, but you can find information about its repair near the bottom of this article as provided by one of the readers. If you have successfully repaired one of these latest versions and are willing to share the specifications, I would be happy to post it here. If you have a "dead" speedometer of the latest version and I'm likely to get a crack to fix it (absolutely no guarantee on success!) then feel free to contact me via comments, below. Last year, a friend of mine had the battery to go wrong on his 1999 Polaris Sportsman 500 4 wheels. Apart from the inconvenience of having to pull-start it, it seemed to work OK. Sort of. Soon, it was noticed that the speedometer was dead and interesting, some other things stop working at the same time, as the ability to put it in four wheel drive. When the battery was finally replaced the speedometer still did not work so as to dig around the internet and discovered that this is a quite common problem with that Polaris vintage - and it seems to work like this: The voltage regulator of the charging system on these vehicles are quite simple, but strongly depend on the presence of the battery to moderate the button DC wildly comes out of the alternator/regulator system to maintain the average voltage in the range of 13.5-14.2 volts or so. If the battery goes completely wrong or is removed, the charging system goes haywire and the voltage can (apparently) exceed 20 volts (and probably higher) and you can risk burning the various indicators, marker and headlights. Another fatality in these conditions seems to be the speedometer: The voltage regulation circuit in the speedometer seems to be quite robust, using high voltage transistors (>=300 volts) to withstand voltage spikes that are endemic to any electric vehicle system. What it looks likethese things is heat. Let me explain. The work of the voltage regulation circuit inside the speedometer is to ensure that the voltage that powers the circuit inside does not exceed about 15 volts or so, it is adjusted down even lower by other circuits for the computer provides meter readings and (probably) the speedometer as well as having something to do with the reverse limiter designed to avoid accidentally driving in high speed reverse and block/commands for the integral traction switch. Â There are also several small bulbs inside the speedometer that provide backlight for the night display and, also these, are also protected by high voltage from the 15 volt controller. Under normal conditions the vehicle is about 14 volts and the task of the regulator is to suppress the peaks and short excursions above it and in this mode the regulator itself does not much. If the voltage increases, however, it must lower the excess voltage and, of course, it develops heat. Apparently, a lot! In testing the speedometer after repair I applied 20 volts and the main transistor of regulation became too hot to touch: A If this had been a hot summer day with the transistor packed inside the waterproof casing of the speedometer without free ventilation, it would have been much warmer. Therefore, with the faulty battery and a later malfunctioning charging system it is easy that the speedometer regulator saw an average of 20-30 volts on its input. At one point the transistor overheated and eventually, running out. Â Fortunately, most of the circuits of the speedometer seemed to survive this given once the adjustment The same Tortor had turned off, all the energy that fed the rest of the circuit went completely lost, preventing further damage. While a new speedometer is available as a spare part, it will cost you several hundred dollars, new! Fortunately, it can be that you can solve it! Mandatory warnings, etc. It is assumed from the beginning that the speedometer is completely erased and that it should still be replaced. Â In this way, if you can fix it, you have an advantage - but if you do not succeed, you will not lose anything more! Before you start, read all this post to know what you are going to meet! Repair of the speedometer requires some knowledge of electronics and electrical components at the card level. Repair also requires good capacity and equipment for desalination and welding – and a "pistola" for welding does not count. A If you do not have the appropriate tools and experience in replacing and installing individual components at the card level. with holes, don't try! The speedometer is part of the vehicle's electrical system and, as such, it is possible that its malfunction, possibly due to incorrect repair, may cause further damage to other components. No, I will not repair your speedometer as with transport, time, "factor ofAnd work, I should upload a considerable percentage of the cost of a new one.ã, I suggest that you find someone experienced in the electronics to help him out if you have to do so. I only know about speedometers on Polaris Sportsman 500 for years 1999 and 2000: Â if you ask me about tachymeters for any other brand, year or model, I can't help you! Â (they could be the same - they can not - I don't know.) â do this repair at your own risk! A don't get angry with me if you blow up something, give fire to your vehicle or cause all the hairs of your dog again, there seems to be a (new?) version of the readers provided me with information about its correct repair: A with its permission, I published this update towards the end of this article. how to remove the speedometer: â the first step is to remove the speedometer from the vehicle. It hurts a bit, but it is not so difficult to do as it is almost the speedometer from the vehicle. It hurts a bit, but it is not so difficult to do as it is almost the speedometer from the vehicle. It hurts a bit, but it is not so difficult to do as it is almost the speedometer from the vehicle. connectors that are stuck in the speedometer, held in place with the release tabs, and two dice that hold the bracket in place: note how these join before removing everything if you are not sure. open the speedometer: place the speedometer facing down on a clean and tidy work area on a surface that does not despise scratching: it is recommended to put a rag or an old towel between the surface of the speedometer by virtue of crimping between these two pieces a rubber seal. wear leather gloves to avoid being stabbed during this phase, use a medium-sized blade screwdriver - preferably a bit worn with rounded edges - and make it slip between the aluminum ring and the plastic body of the tachymeter on the back, opening it as you proceed, straightening it. slide the screwdriver along the perimeter and straighten that soft aluminum ring and you'll probably have to go around several times to do the job. Figure 1: The soft, black aluminum ring, around the perimeter of the tachometer that holds the front to the body. Â press this right carefully. (this photo was taken after I had already opened and repaired it - and partially closed again.) click on the image to enlarge it. Once you get 75-90% of the back of the straightened ring, you'll be able to open the ring outside the front: A put it aside. A with the removed ring you should be able to use the nails and press the front cover, clear from the body of the speedometer. Be careful with the black plastic rod under the button, carefully observing how it is installed and paying attention not to fly away from someOnce you have the lid out, set it aside with the black plastic pole that is located inside the lid. Remove the the This is a bit difficult and you can ruin the speedometer as a total loss, you shouldn't feel too bad if you do it. First, notice how much the needle is pushed over the spindle:  $\tilde{a}$ , we advise you to remember it when you put it back on. If you have very strong nails, try pulling the needle directly from the speedometer, but whatever you do, apply the voltages always  $\hat{a} \in \mathbb{M}$  ie, directly extract the needle because you don't want to fold the spindle!  $\tilde{A}$ , when You pull the needle make sure that the speedometer is on the workbench with the padding on it because if you come off suddenly, I don't want to slam your hand or speedometer on the workbar and break something! If you can't remove the needle with your fingers, you will need to apply a little more power. You can cut some sheet of paper or thin cardboard (for example from a cereal box) so as to cover the entire surface The speedometer, but allow the access to the needle and its spindle, to avoid accidentally marking the surface of the speedometer. Now, using two medium-sized blade screwdrivers, extract the needle uniformly from the spindle using the paper / cardboard to avoid damaging the face of the speedometer: it is advisable to wrap a rag around the body of the speedometer and lock it gently â € "but firmly â €" in a vise.ã, we hope that the needle gets closer without breaking anything else, save for a new Speedo! Remove the speedometer module from the body: using a small screwdriver blade or, preferably, a plastic piece of the same size and shape, carefully push the face of the speedometer. It is actually printed on a piece of plastic Pretty heavy self-adhesive, the thickness of a postcard  $\hat{a} \in \varpi$  that you want to pry up. You can be a bit difficult to get the purchase on the tachometer's face and you could bend a small piece of metal into a hook like a clip to act as a tool. Figure 2: Carefully raising the plastic of the speedometer, you can access the three screws holding the module in the body. The other two screws are located at 1/3 of the circumference, about «10» and «40Â »MPH.Ã, If you can't remove the needle before this step, make sure you move it out of the way when you approach your face. Plate so as not to break it accidentally. Click on the image to enlarge it. Start pushing towards the underlying plastic face and in the center of the LCD odometer display, at the bottom of the speedometer and, once raised a little, you will see under a Philips type screw: A, keeping the speedometer facing The high with a small screwdriver, use another screwdriver to remove the screw. There are two other screws, each situated 1/3 of the sense On both sides: A, remove those too. Now, the only thing that holds the speedometer module inside the case is the friction and silicone used for around the wiring pin connectors on the back. Using a small blade screwdriver, work your way around the perimeter of the inside of the speedometer, wedging gently between the outside body of the speedometer and the module itself, reaching slightly beyond the face of the speedometer to do so. After spinning several times, applying some torsion and / or potying force, the module will hopefully dissolve and gradually come out. When it does, the pins from the electrical connectors on the back will be pulled through the case and soon, you will have the module separate from the case. IMPORTANT NOTE: There are one or two cylinders with granules packed inside them in case they contain moisture absorbent compound. When you remove the body of the module, they can come out, or they can be (at least temporarily) locked into position in their own slot within the module - but in any case, note where they originally sit. Take them out and put them in a bag "Zip-Lock" (tm) and suck the air to protect them from additional moisture while you are working on the speedometer. Remove the LCD and access the back of the circuit for soldering: To gain access to the "older" side of the circuit board, it is necessary to remove the portion with the face plate, after removing the needle. This will also remove the LCD display of the odometer. It is advisable to do it on a workbench covered by a rag or towel in case the fragile LCD falls. On the rear side of the speedometer module (the "component" side of the circuit) you will find four black screws which roughly correspond to the four angles of the LCD display. Place the speedometer face down on a piece of cloth, remove these four screws: The front of the fender separates from the circuit. This front portion also keeps the LCD in place and can drop. If it doesn't come out by itself, carefully remove it - noticing the signs on the LCD and how they were oriented relative to the card. Figure 3: The repaired card showing the LCD. Note the orientation of the writing on the LCD relative to the card. If you look carefully, you will notice marks on the top left edge of the LCD which can be used to indicate which way is at the top. Towards the 2-hour position of the speedometer table you can see the repair to the damaged track. Since the board is coated with a sticky conformal coating compound used for moisture protection it is difficult to avoid discoloration when welding due to heat and flow. Click on the image for a larger version. The electrical connections of the LCD to the circuit are made by two small strips of pink-ish conductive rubber (often called "Zebra Strips") and these usually attach to the LCD. If they are stuck to the edge, very carefully remove them, but if they are stuck to the LCD. clean and dry food container. You can notice that the LCD itself has a number of part printed on it: Note its orientation so you can reinstall it properly. Now you have access to both sides of the circuit. Identify faulty components: Important note (again) on through hole versions compared to surface mounting: The images and descriptions below assume a through-hole version of the speedometer. It would seem that a later model of this same speedometer uses surface components for some of those that fail. While I didn't see a superficial editing version of this person speedometer uses surface components for some of those that fail. attempt a repair - and it was successful! With its kind permission, some details about repairing a surface-mount version can be found at the bottom of this blog entry. It seems that the only part that is sure to go is a large power transistor, but there may be two components next to it which are also destroyed - and this damage can be highlighted by some signs of burns on the circuit board: See Figure 4 below for the identification of these components. Figure 4: Location of the likely bad part (s). When I took this photo I had already replaced the TIP48 and MPSA42 - but not the Zener diode. There were reported cases where the parts got so hot that the welder dissolved and that they simply fell out: If this is the case with your speedometer, make sure you test the parts before reinstalling them or, if you do not have the structure to do so, simply replace them. Click the image for a larger version. Although only one or two of these components can be bad, I would recommend replacing them all three. These are: a high voltage transistor NPN TIP48. This is the most likely component to be damaged and is a transistor with a metal card. In Figure 4, above, the cables are, from left to right, B-C-E. (The NTE equivalent is the NTE-198. Note that I had previously unadvertently listed the '197, which was wrong.) A low-power NPN high-voltage transistor MPSA42. This is a small black transistor located near the TIP48. In Figure 4, the cables are C-B-E from top to bottom. (The NTE equivalent is the NTE-287.) A 1N5245 15 volts, 1/2 watt Zener diodo. This is located near the transistor MPSA42 and is a small, (usually) red/orange glass device on axial cables. In Figure 4, the end "banded" is the lower end. (The NTE equivalent could be the NTE-287.) A 1N5245 15 volts, 1/2 watt Zener diodo. This is located near the transistor MPSA42 and is a small, (usually) red/orange glass device on axial cables. In Figure 4, the end "banded" is the lower end. (The NTE equivalent could be the NTE-287.) A 1N5245 15 volts, 1/2 watt Zener diodo. 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If you have familiar with the electronic components: the TIP48 can be replaced with any NPN bipolar transistor that is on the «main 'side of a switching power supply AC  $\hat{a} \in \hat{a} \in "$  as a power supply for computer turned off. A, usually, these transistors have a capacity of over 400 volts and are found in a type to-220 â & "case with a plastic or isolated tab â &" make sure you only have a nominal power of at least 300 volts And that I have the same Pinout (ECB seen from left to right with the cables facing down and the label facing you) of the original Tip48! Å, It is likely that this transistor has a number that starts with « 2scâ "(or simply Å« CÅ ») followed by 4 digits: Use came from a scrapped video recorder, had a power of 500 volts and the case had a plastic tab instead of the metal tongue of the original device. The MPSA42 Åf i A high-voltage NPN transistor and low power of the type used typically in the video drivers for the cathode pipes of the old televisions and suitable equivalents can be found on the small circuit board connected to the end of a Discarded TV.ã, I happen to have some ZTX458 transistors â € "devices that were the same or better voltage / curve. Just make sure you take into account all the differences in the replacement transistor pineout! I didn't have around 1N5245 1/2 Watt, 15 Volt Zener, but I had a 1N4744 Zener that is a version, more than 1 watt robust with the same nominal power, so the I used. Replacement of the components: Ã, first: unless you are experts in replacing the components and repairing the circuits, I would not suggest you to do this procedure! Use a control at a controlled temperature. a, too little heat, it damages the card trying to get the off components. Do not use a welding gun for this repair work: A, if it's all you have, you shouldn't try it because you will probably ruin the card! A, using the phone or the camera, take some close photos of both sides of the card Before starting as a possible help in replacement. A vacuum desaldering tool is the ideal, but «Solder Wickâ» (TM) or even a spring «Salder SuckerÅ» or «Desalder's light bulb» will work .ã, if you don't have any of these It will be difficult to get the passing holes deleted to install the spare components without tearing tracks from the card., both sides of the circuit and most of the components are from a moisture-resistant coating is slightly rubbery and when welded, it discolors. A @ lt is possible to "seat through" even if it is necessary to pay attention to ensure that welding joints are clean and good. A When welded, you can clean the flow with alcohol and a cotton swab, but discoloration will probably remain. A (If weld is water-based, make sure you absolutely have removed with clean water corrupt as many of these types of flows can slowly connect.) When removing the old components (the two transistors and the Zener diode) it could be easier to clip them from the board using diagonally cut pliers. A This removes the body of the device and allows independent removal of each device. Be sure to clean the holes through the card too! In my case, the heat of the destruction of the original TIP48 and its subsequent removal from the board have actually damaged a track so I had to repair it with a small piece of wire (I used wire-wrap thread) on the lower side (this is the short green wire visible in Figure 3) but probably the damage will not be so serious. After inspecting damaged tracks, install new components. Â The above notes indicate which cable is which when replacing the two transistors and the diode. Figure 5: The recently repaired speedometer. A Shows a speed because I was injecting a signal on the back to simulate the input of a wheel sensor. Looking carefully you might notice that the tenth of mile on the LCD display is missing part of its upper half: A To repair it I had to unmount it again, clean the rubber pad (« zebra strip") the contacts of the card and the LCD with a little bit of denatured alcohol and reassemble it to remove the dust that prevented from that particular finger to function properly. Click on the image to enlarge it. Resume everything: As they say, "The mounting is the opposite of the disassembly"! Some comments: When reposing the LLCD, it might be a good idea to clean the upper and lower edges of rubber strips with a cotton pad filled with alcohol, and this should also be done for all the LLCD surfaces itself and for metal contacts on the board. support and the LLCD goes over it. A When pairing the face of the speedometer back to the circuit, make sure you have reinstalled the right-hand-up and adjusted (remember when you noticed the signs on the LCD?) so as not to accidentally ruin h and break it when you noticed the signs on the LCD? tightened firmly - but not so tight to break theBefore sealing everything, Remove obvious fingerprints from the LCD display (using a cotton swab) and the inside of the face plate and the speedometer. If you have a bench-type power supply capable of 12 volts at about 600 milliami, you can run some preliminary tests of the speedometer of +12 Volts to Pin "A" and the ground to Pin "B." Hopefully, the lights will come on and you'll see the odometer displaying the numbers. See below for a description if the PINOUT. If you have applied the power and everything looks OK, gently push the partway needle onto the spindle, aligning it with "0." The applied power, move the needle scale (say, to 20-40 miles per hour) and watch it go back to zero: it is if you slightly interrupt the zero look (it might take 10-15 seconds to settle when the unit is turned on), then pull out the pointer and re-wrap it, re-doing the previous steps You're going back until you catch it to land on zero. If you cannot turn on the speedometer, align the pointer with zero and then scale it up to 20 or so. After 5-10 minutes (yes, it might take so long to come back slowly!) Look again To see where you are pointing: A" If it is not zero, remove and try again. Once you are satisfied that the pointer is correct, push it firmly on the spindle as you noticed it had been pushed before you removed it. Move the needle back up to the hand and verify that it will (Slowly) move down, indicating that it is not binding anywhere. If the pointer is not pushed very far it can jam the inside of the front end. In case you might have noticed one or two small cylinders with granules inside them that are still in place, or previously had fallen off and it is recommended to be placed in a sealed storage bag. These are moisture absorbers and sit in a slight indentation one side of the case. It is recommended to keep waterproof: Apply a thin layer of silicone grease to the gasket that goes between the body of the speedometer and the transparent front plate, taking care not to take it on the face plate where you can see it. (Only clean grease if you get it on the display or on the back of the transparent lid.) You can use the "silicone-based plumber grease available in virtually any hardware store/home improvement. Don't use an oil-fat based on that! When you put the face plate to make sure you have pushed the needle sufficiently into part and not rubbed on the internal front plate. Slide the aluminium ring into place. With the speedometer face down in a cloth (preferably a gap To accommodate the button on the front panel) Use a piece of wood to rearm the the ring to fix the facial plate to the body. A You probably have to go around the perimeter several times to keep it tight. connectors on the back: Â This will help prevent moisture input and prevent possible corrosion of electrical connectors. Â Still, the "Hydraulic Gauge" or the type used to lubricate the rings "O" is the same type of fat and will work well and this is available everywhere you can buy hydraulic supplies and parts - including big-box home improvement shops like "Lowes-Depot". It is not recommended to use "normal" oil fat (e.g. axle fat, vaseline (tm)) as this degrades plastic and connectors! Comments on pin-out and test: Note: If you run an internet search, you should do it before reinstalling it in case. With the tachometer facing downwards, direct it so that the 6 pins of the larger connector (the one for the wheel sensor) are located right of it with its pins running vertically. For the big connector, the "A" pin is on the left and are indicated in the available drawings like A-F, from left to right. A For the 3-pin connector are A-C starting from the top and working down. Applying the voltage to these pins using a regulated and limited current power supply set at 12-15 volts to a maximum current of 600 milliamps for 1 amp, you should be able to feed the speedometer. Do NOT feed the speedometer in the test phase directly from a battery, as this could provide a virtually unlimited current in case of short circuit, remove the power supply "sees" a short circuit, remove the power supply "sees" a short circuit or accidental failure. Do not connect polarity backwards - not even for an instant. If the limited current power supply "sees" a short circuit, remove the power supply "sees" a short circuit or accidental failure. the replaced components. If it works, the lights should turn on and if you move the tachymeter needle with your finger, on top, it should reset much faster than when it is turned off. An additional test is that if you increase the voltage beyond 14-15 volts (but not beyond 20 volts!) the lights do not turn on - sure sign that the regulator now works properly. If you do, now is the time to recheck that the needle points to zero. If you are curious, you can apply a square wave signal from an audio generator (3-5 volts RMS) between the B and C pins of the 3-pin connector and vary it from about 5 Hz to 200 Hz and you should see the speedometer rise with increasing frequency while simulating, with your audio generator or "generatorFunctionsâ €, the entrance from the wheel sensor. Earth while the PIN «Bâ» is the signal input. There, the unit must be powered by the speedometer â € "and odometer, for this - Indicate. If you do not have a test device to generate such a signal, a timer chip «555â» can be wired (with the appropriate components) to generate a variable frequency square wave train. FINAL WORDS: If all goes well, the speedometer, the 4-wheel drive switch, the «Reverse Override» button and the odometer will work correctly again! Note that it is not a guarantee that will be waterproof as before, since you probably miss the special machine necessary to correctly crimp the aluminum ring, so it is probably better to keep it away from the rain the most possible  $\hat{a} \in \hat{a}$  Good practice, anyway! Comment: Sometimes I get asked a guestion through the comment tool of this blog. Unless you include a return e-mail address, you will have to check back here to see if I responded as I will not be able to respond in any other way. Update: Starting October 2015 August 2016 October 2017 November 2018 The repaired speedometer still works well. Repair of the superficial mounting version of the speedometer one of the readers (Mathias) was inspired by this blog post and decided to try a repair of the most recent version of the speedometer. It is not known. with exactness, in which numbers Model and years This speedometer has been used (or if it is yet!) The following describes the repair of a device from a Polaris Sportsman 335.a. again, unless you have familiar with the work on small electronic components And you don't have the tools suitable to do it, look for someone who has familiar with the tools before trying a repair! Figure 6 Å, used with the permission of Mathias, this is a photo of the surface mount version found in a Polaris Sportsman 335 of 2000. It is believed to be (more or less) of the same circuit shown in Figure 4, but which Use more superficial assembly components. The related conversation thread â € "including a reference to the photo above  $\hat{a} \in "$  is found in the comments below:  $\tilde{A}$ , look for those related to the user  $\hat{a}$  a «Mathias999US.Å» Click on the image to enlarge it. Figure 6, above, shows the surface mount version that seems to undergo the same fate when the unit is operated without a battery to moderate the voltage. The above design is commented with some clarifications added below: TIP48 ⠀ "This is the same power transistor (through-hole) used in the previous version, except for surface mounting. The marking of « 1DT» â € "This is the same function of the MPSA42 used in the previous version, except for surface mounting. but refers to a NPN transistor. It is believed to be a BC846 transistor, a generic PN device with one nominal of 65 volts. Note that the MPSA42 is available with the same SMD size as the previous one and is known as the "PMBTA42". This may be a better choice than the BC846 in terms of its ability to handle voltage peaks, if the Polaris were powered without battery. "Unidentified diode" - - There are two of these: the great seems to be just a standard diode. If open / patented, the surface version of the 1N4003 (through 1N4007) should be fine. The small is probably a surface-mounting version of the Zener diode said above - ie a unique 15 volt. Capacitors: These are not marked in Figure 6, but they are large, metal cans near the TIP42. These are often damaged by heat and voltage when the speedometer is performed without battery. If one / both of these capacitors they all look inflated or swollen, if it seems that their plastic labels have rotted and divided and / or if there is a sort of liquid that comes out from them - both from the seam at the top or the circuit - They must be replaced! These are 470UF capacitors, 25 volts. Before removing them known as the end of the capacitors are marked with the sign less so that the new ones can be installed correctly. [END] This page stolen by ka7oei.blogspot.com ka7oei.blogspot.com

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