Russian Motorcycle Turn-Signals 01/11

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What's the most fragile, yet inexpensive, part in your Russian motorcycle? -the engine, -the alternator, - or the owner? This part hasn't always been around. In fact even today, less than half the States require them. It's your Turn-Signals!

Let's take a good look at turn-signals for Russian motorcycles over the last fifty years. The subject surfaces in forums when folks try to trouble-shoot the circuit or try to substitute Light-Emitting Diodes (LEDs) for the incandescent bulbs. We'll trace the history of turn-signals, understand the function of the flasher unit, go thru the circuitry, trouble-shoot the problems, and understand the compatibility with LEDs. We no longer have to fear what's in that little can called the flasher unit. We'll also look at a little circuit to audibly remind you to disengage the blinker after executing a turn. So let's enter the exciting world of flasher relays. Many people have been held back, but now the truth is finally exposed. We'll find that like everything else, turn-signals are becoming solid-state. Please open the attached PowerPoint PDF presentation entitled "Russian Flasher Relays" for greater detail. Also included are replies containing Ural and Dnepr schematics with flasher circuitry.

Flashers (the turn-signal kind)

We'll take a look at the unusual device called a thermal flasher that makes your turn-signals flash. Later we will see the electronic (electro-mechanical) flasher and see some of its advantages. Inside the thermal flasher unit is a bi-metal strip that will bend when heated. It is mounted in such a manner as to snap suddenly (and loudly) when heated or allowed to cool. As the current flows through the bi-metal strip, the strip heats up and momentarily disconnects the power flow to the signal lights. This causes the signal bulbs to go out. As the strip cools it bridges the connectors and re-lights the bulbs. This happens about one time per second, thus enabling the necessary blinking action of the turn signals which alerts the other drivers of your intentions. Thermal flasher come in 2-prong (terminal) and 3-prong configurations. All flasher units on Russian motorcycles up to 2006 were 2-prong thermal flashers. Let's see how turn-signals are wired.

How It Works!

When the directional turn switch is operated, a circuit exists between the battery, flasher unit and turn-signal lights back to the battery. When you push the handlebar turn-signal switch left-or-right, the thermal flasher connects to the turn-signal bulbs. This completes the circuit, allowing current to flow. Initially, the spring steel does not touch the contact, so the only thing that draws power is the resistor inside the flasher unit. Current flows through the resistive wire, heating up the smaller piece of spring steel of the bi-metal strip and then continuing on to the turn-signal lights. At this point, the current is so small that the lights won't even glow dimly.

After less than a second, the small piece of spring steel heats up enough that it expands and straightens out the larger, curved piece of spring steel. This forces the curved spring steel into the contact so that current flows to the signal lights unimpeded by the resistor. With almost no current passing through the resistor, the spring steel quickly cools, bending back away from the contact and breaking the circuit. The cycle then starts over. This happens at a rate of one to two times per second (60 to 120 cycles per minute).

Turn Signals Required?

Turn-signals, formally called directional indicators or directional signals, and informally known as "directionals", "blinkers" or "flashers," are used to alert other drivers the intention of a lateral change of position (turn or lane change). The first application of a flashing electric turn-signal was used on the 1938 Buick as a new safety feature, advertised as the "Flash-Way Directional Signal." As with all vehicle lighting and signaling devices, turn-signal lights must comply with technical standards that stipulate minimum and maximum permissible intensity levels, minimum horizontal and vertical angles of visibility, and minimum illuminated surface area to ensure that they are visible at all relevant angles, do not dazzle those who view them, and are suitably conspicuous in conditions ranging from full darkness to full direct sunlight. The question of turn-signals being legally required is answered by the American Motorcyclist Association (AMA, Pickerington, Ohio 43147 (**http://home.ama-cycle.org/amaccess/laws/**). Currently only 20 states require turn signals. In the

end, it's the safety issue that is most important. Safe motorcycle drivers want to maintain and use their turn-signals.

Replacement Parts (Lamps and Flasher Relays)

The replacement for the 12-Volt turn-signal light is the 1156 (12.8-Volt/2.1-Amp/27-Watt, rated at 32 Candle-Power light intensity). The commonly available 6-Volt light for older Russian motorcycles is the 1129 (6.4-Volt/2.63-Amp/16.8-Watt, rated at 21 Candle-Power) which also uses the same BA15S Single-Contact (SC) bayonet base.
Jack Loganbill (http://www.thewoodshop.20m.com) compiled a list of replacement parts;
Bike Turn-Signal, Brake Lights, and other Sidecar Lights: 1156
Running Light: 97 (5-Watt)
Rear sidecar running/brake light: 1157 (double-contact)
Indicator Lights (high beam, alternator, neutral and turn): Sylvania 2721 (1.2-Watt)
Instrument Lights (speedometer face): Sylvania 3893 (4-Watt vs. 3-Watt)

Turn-Signal Indicator and the "Sneak Path" (please see PPT attachment0

For the blinker circuit in my 2003 Ural Patrol, the on-resistance of each 1156 bulb is 6 Ω (ohms) and the indicator lamp is 136-ohms, twenty times larger than that of a single 1156 turn bulb. Since the resistance of the two signal lamps on either side are wired in parallel, the current going thru the "sneak path," thru the indicator lamp, is less than that of the primary path by a factor of forty. Thus the indicator-light seriously limits the current flow in the "sneak path" and the non-selected turn-signal incandescent lights don't glow.

Now if someone replaces all the turn-signals with LEDs, there will be trouble because LEDs draw much less current. As a result the sneak path current will start to be equal to the primary circuit current. The indicator lamp is more than capable of passing the load current to both of the non-selected LED turn-signal lamps, so now you have 4-way flashers instead of turn-signals. For example, if you were to replace each of your 1156 turn-signal bulbs with SuperBright LEDs (http://www.superbrightleds.com/) "1156-A30 ", the current is only 0.12-A. This yields a resistance of about 106-ohms. Thus the primary circuit present a 53-ohm path (two LEDs in parallel) and the sneak path will be 181-ohms (128Ω + 53Ω). Under these conditions the current in the sneak path will be about one-third the current in the primary path. The selected turn-lights will glow brighter, but the un-selected side will appear almost as bright.

Some folks suggest using load resistors (also called load equalizers) wired in parallel with each LED to simulate the incandescent bulbs, but they consume power and defeat the whole concept of using LEDs to conserve power. The solution is to use steering diodes to ensure that the sneak path is prevented.

Thermal 3-Prong Flasher

The thermal flasher only works properly when it is driving two 1156 turn-signal bulbs in parallel. To test the thermal flasher unit, do the following:
a.) Connect a hot wire (12-Volts) to the "X or B" terminal of the flasher unit.
b.) Connect the load lamps between the "L" terminal and ground (return to the earth terminal of the power supply or battery).
c.) Connect a grounded test lamp to the "P" terminal on the flasher unit.
With power and load connected, the flasher unit should commence clicking loudly on/off about one cycle per second. The lamps should flash, and the lamps will get hot with about 10 watts of heat each (50% on/off duty cycle). If it clicks at about the right rate, and the test lamp also flashes, then the flasher unit is in good operating condition. If the flasher unit doesn't click at the right rate, or the pilot lamp doesn't flash, then the unit is considered trash and needs replacement.

Upgrading Your Old Thermal Flasher to a New Electronic Unit

The Russian Flasher unit supplied on the bikes is a thermal type. At your local auto parts store ask for an electronic 2-prong turn-signal flasher for a GM product. Just about any 12-Volt, 2-terminal flasher will work. They cost about $8. Turn the bars hard left and look behind the right fork. You'll probably have a hard time

finding a flasher with that style of mount other than the original. You will have to crimp ¼" female spade connectors on the two wires to replace the round terminals but that's easily done. A wire-tie will hold the new flasher in place. The rubber grommets are just the way the old flasher is mounted to the bike. Remove the old flasher by bending the mounting ears straight out and pull toward you, then remove the aluminum strip from the flasher that forms its legs. Then remove the old Ural flasher and carefully remove the mounting bracket from the old flasher. Hook it up and it should work, switch leads and see if it works better one way than the other, as there is no + or - on the flasher. The electronic flasher will work at a constant rate of speed no matter what the motors speed. You want a "heavy duty" flasher meant for trailering, etc.

Some relays, such as the Tridon 550, are made for trailering and flashes independent of the circuit load. Thus if a bulb filament blows out the flash rate won't change to indicate the fault. Tridon's EL12 being two-prong and EL13, the three-prong, are load-independent and about the same size as the old Russian flasher. Under $10 at most auto stores.

You can use the 3-prong flasher in an older Russian bike, just ignore the "P" terminal. The 3-prong thermal or electronic flasher unit has three terminals, "X or B" for Battery or Input Power, "L" for Load or Lamps, and "P" for Panel (dash indicator lamp). The "P" terminal, going to the dashboard yellow turn-indicator light, will be open circuit at rest, and the other two terminals are functionally interchangeable. The canister does not need to be grounded, but it does need to have the correct electrical load to operate properly.

Light Emitting Diodes (LEDs) for Turn-Signals

A bulb has a lot of drawbacks. It is fragile by nature. It sits in a socket that is prone to corrosion. The filaments are always at the mercy of vibration. They also have heat issues if they're mounted inside or near anything that's prone to melt. The circuitry in all Dneprs and pre-2006 Urals use a single turn-indicator (instead of separate left and right indicators). Usually, when you remove incandescent bulbs from a blinker system and replace them with LEDs - the stock flasher relay begins to blink too fast. The main attraction is also the main problem in substituting LEDs, and that is the current is radically reduced from the stock incandescent bulbs.This is actually the designed response of the flasher relay as it is trying to indicate to the operator that a bulb is burned out, which is not the case. This "bulb-out" function is in the federal code for US cars since 1970. This means that you will need two blocking diodes up there to allow LED operation. This will keep the small current from flowing thru a "sneak path" (see PPT attachment).

The **best way** to correct the flash rate on any motorcycle is to replace the thermal factory flasher relay with one that does not have a minimum load requirement and/or bulb-out notification.

Trouble-Shooting Your Turn-Signal

Turn-signals are one of the easiest systems in your motorcycle to trouble-shoot. Your signal flashers either work or they don't. If your turn signals have stopped working, it'll be doing one of these things: blinking rapidly, coming on without blinking, or not coming on at all. The good news is that all of these symptoms point to only four possible issues, a bad turn-signal flasher relay, a dirty directional turn-signal switch, a dead bulb or a corroded ground path. If the signal blinks really fast, you have a bulb out or corroded ground or socket on that side. Modern (Urals 2006+) wiring adds a ground-return wire from each bulb to solve that problem. If it doesn't come on at all, or doesn't blink, you'll need to replace your turn-signal flasher relay. Your turn-signal relay is easy to replace, and they are relatively inexpensive.

You can test the turn lamps and wiring (with the key ON) by shorting across the two terminals of the flasher, while activating the turn signal switch. If the lights illuminate, then the flasher unit is most likely bad. When the flasher fails it will usually light the turn signal indicator instrument panel, but will not flash it.

1. Turn-signals light, but do not flash: Replace the flasher.
2. No turn-signals light on either side: Check the fuse. Check the flasher by substitution. Check for open circuit, short circuit or poor ground.
3. Both turn signals on one side don't work: Check for bad bulbs. Check for bad ground in both housings. Turn signals (prior to 2006) must have ground continuity to the frame.

4. One turn-signal light on one side doesn't work: Check and/or replace bulb. Check for corrosion in socket. Clean contacts. Check for poor ground at socket.

5. Turn-signal flashes too fast or too slow: Check any bulb on the side flashing too fast. A heavy-duty bulb is probably installed In place of a regular bulb. Check the bulb flashing too slow. A standard bulb was probably installed in place of a heavy-duty bulb. Check for loose connections or corrosion at the bulb socket

6. Indicator light doesn't work in either direction: Check If the turn signals are working. Check the dash indicator light. Check the flasher by substitution.

Fuses

In the 2002-2005 schematic (please open attached PowerPoint presentation), there is an in-line fuse inside the headlight cavity. In the 2006-2007 schematic, we see that the flasher fuse has been moved to the common fuse block.

Audible Reminder to Cancel the Turn-Signals

Without a windshield, going at 55 mph, wearing a padded helmet, the roar (industrial sewing machine) of the engine (or gears) make it hard to hear the rhythmic clicking of the flasher relay, or see the turn-indicator in full sunlight.

We added a piezo buzzer (piezo-electric transducer + oscillator circuit in plastic enclosure) to provide an audio (3 kHz) signal that beeps in accordance with the turn-signals (see attached PPT slides). Simple tap connectors, from your local Auto Parts Suppy, do not require any cutting of the factory wiring to the leads going to the yellow Turn-Indicator lamp socket. It sounds much like the warning signal of a fork-lift backing up. It's annoying, but not as annoying as seeing a motorcycle tooling along with a "stuck" turn-signal.

Ivan's Crazy Tail-Light Wiring

Several folks have replaced the rear brake and tail lights on the bike with a 1156-equivalent LEDs. Unfortunately the outside portion of the socket is not grounded, but is the "hot" 12-Volt side. All the others lights are wired correctly with the outer shell grounded. You could replace just the "sockets" or replace the whole tail-light and then use LEDs.