

Shift Pointers

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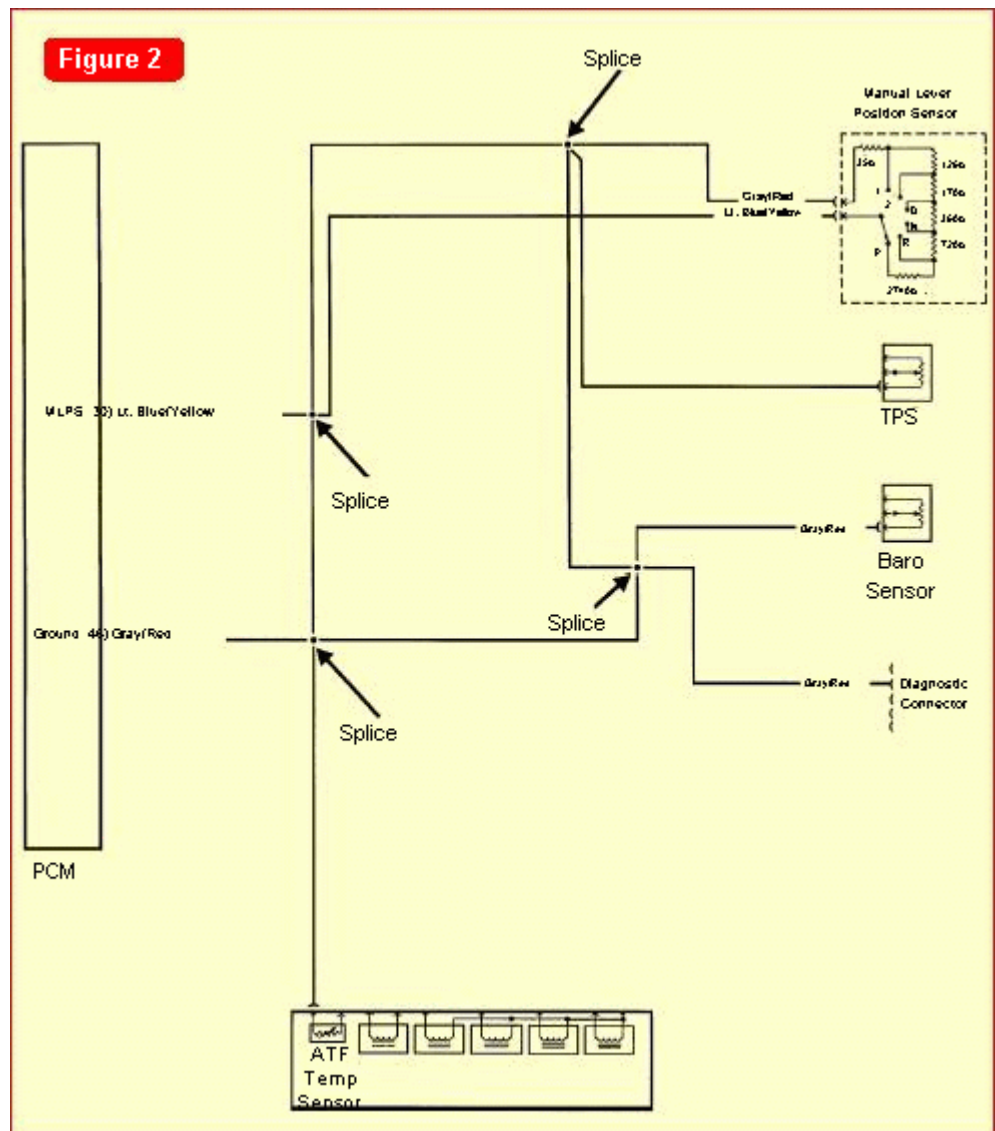
Ford's Nagging Neutral Nonsense

By Pete Luban

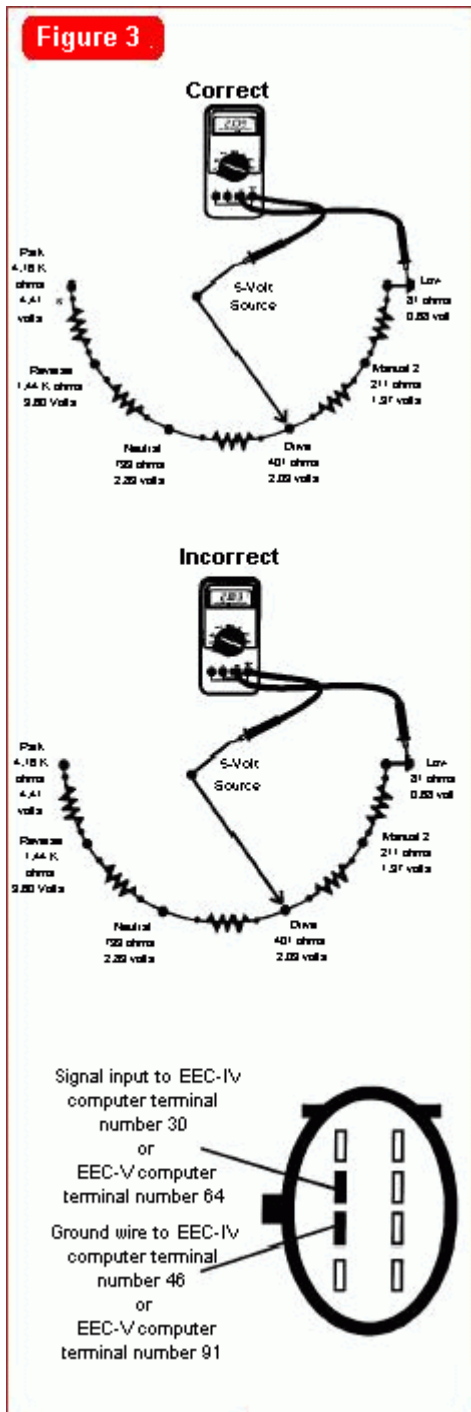
One of the most-difficult problems to diagnose on a Ford car or truck is a sudden neutral condition while the vehicle is cruising in 4th gear. Now this can have a number of causes, depending on which transmission is in the car or truck, but the cause we are going to discuss here is that #1 Manual Lever Position Sensor – that's right, the old MLPS. This sensor is responsible for more malfunctions than any other sensor in the system, and the kicker is that it seldom stores a code 67 or 634. Actually there is a standing joke in our industry that says, "You got a problem with a Ford, change the MLPS; it fixes everything," which ain't that funny because it's not that far from the truth. Some of the problems the MLPS can cause are wrong-gear starts, TCC hunting, no 4th gear, engine stalling, high or erratic line pressure and the problem that this article is about – a sudden neutral condition. Whether the MLPS is attached to an E4OD, AXODE, AODE or CD4E, the operating characteristics are the same. What that means is the MLPS is classified as a step-down resistor. The MLPS is supplied 5 volts from the computer as a reference voltage, and as the shift lever is moved from park toward manual low, the voltage in each gear-shift position will decrease as

Figure 1

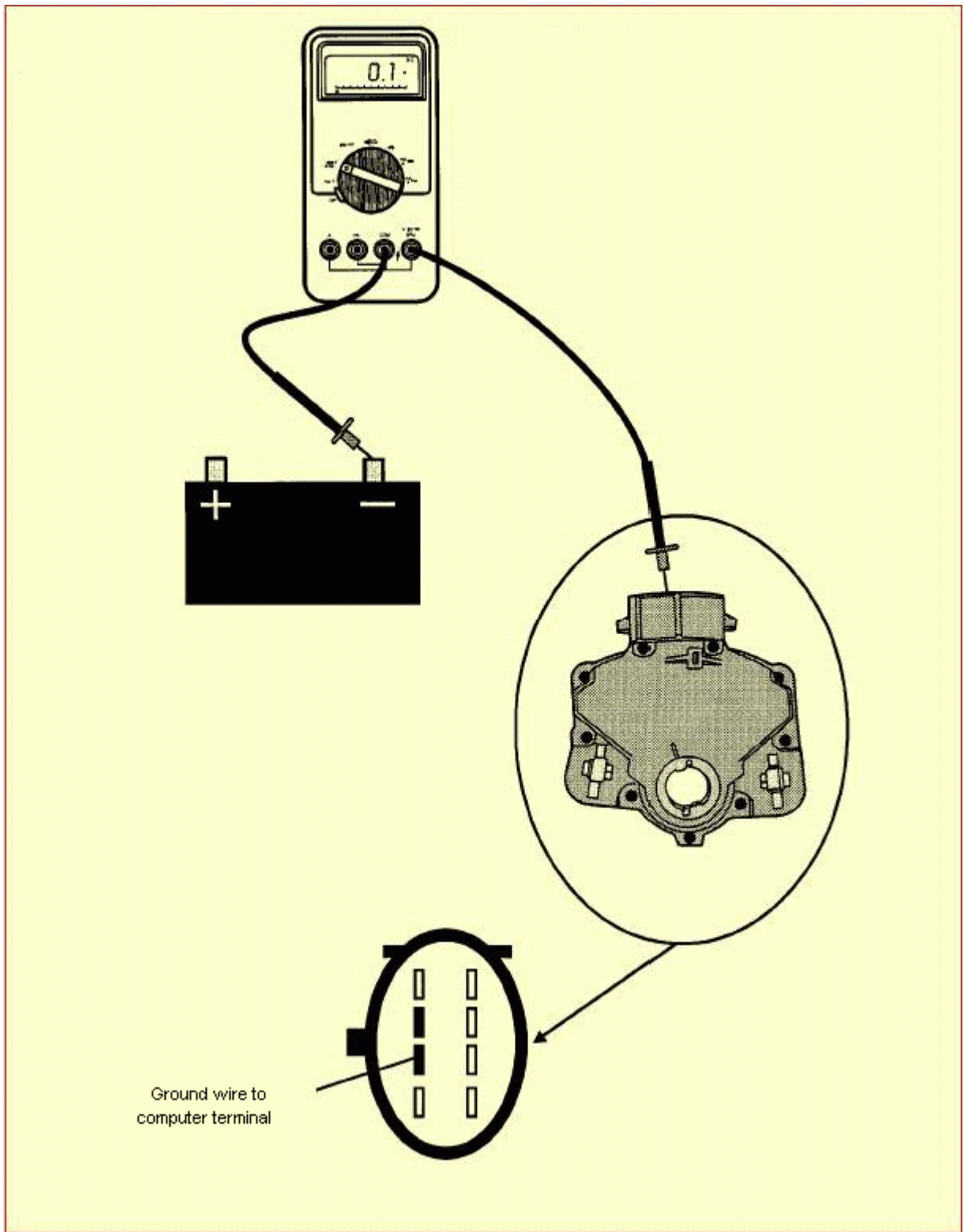
Manual Lever Position	Resistance (ohms)		Voltage
	Min	Max	Range in Volts
Park	3770	4607	3.97-4.85
Reverse	1304	1593	3.25-3.96
Neutral	660	807	2.55-3.11
Overdrive	361	442	1.88-2.30
2/Drive	190	232	1.23-1.51
1	78	95	0.61-0.75



shown in Figure 1. The MLPS also can be checked for correct resistance, also shown in Figure 1. This way, if the resistance checked good on the bench but the voltage does not check good in the vehicle, you know there must be a wiring or ground problem. I know what you are thinking: You replace the MLPS on every job you do, so why should you check the resistance on a new part? Well, that's fine, but one thing has become very clear lately: **NEW DOES NOT MEAN GOOD!** Now, let's get to the meat of the problem. As you can see in Figure 1, the voltage in the drive/overdrive position can be 1.88 to 2.30 volts. The O.D. Cancel button, on those vehicles equipped with one, has no effect on the voltage seen in the drive position, nor does it matter whether the vehicle has a gas or diesel engine.



This would be the voltage seen in the D or OD position if it were available on the scan-tool screen in the data mode. Unfortunately, this information is not always available, and this "glitch" may occur faster than the scan-tool's update capability so the voltage jump would be missed. Therefore, a digital multimeter must be used to monitor this voltage. This is of the utmost importance in diagnosing the sudden-neutral condition. This voltage should be monitored when the neutral condition occurs by placing the multimeter's positive lead to computer terminal 30 if it is an EEC-IV system, as illustrated in Figure 2, or to terminal 64 if it is an EEC-V system. This wire is light blue/yellow on all applications except vehicles with the CD4E. On these the signal wire is red/black. Now, here is where this gets a little involved. The negative lead of the multimeter should be placed at the MLPS signal-return ground terminal at the MLPS. The reason is that the ground circuit for the MLPS can be shared by as many as FIVE other sensors, as seen in the wiring diagram in Figure 2. This means that there are factory splices in this ground circuit. If you check this ground at computer terminal 46 for the EEC-IV or computer terminal 91 for the EEC-V, the ground may check good but could be bad at the MLPS if there is a problem on the MLPS side of the splice, as also can be seen in the wiring diagram in Figure 2. This means that there are factory splices in this ground circuit. If you check this ground at computer terminal 46 for the EEC-IV or computer terminal 91 for the EEC-V, the ground may check good but could be bad at the MLPS if there is a problem on the MLPS side of the splice, as also can be seen in the wiring diagram in Figure 2. The ground-circuit wire for 1989-90 F- and E-series trucks is black/white; all other vehicles use a gray/red ground wire except for CD4E applications, on which the ground wire is black/blue. Once the multimeter is connected to these circuits, as seen in Figure 3, place the meter where it can be seen while driving. When the transmission suddenly neutrals, be sure to have someone observe the multimeter, or use the meter's MIN/MAX feature to record the highest and lowest voltage readings that occurred in the circuit. If the voltage jumps toward 3 volts as shown in Figure 3, and at that very moment the transmission neutrals, either the MLPS is faulty or the MLPS ground circuit is poor. Under normal conditions, this voltage reading **SHOULD NOT CHANGE!** When the voltage jumps toward 3 volts, this indicates a neutral-shift-lever position to the processor. This confuses the computer's logic system, and therefore the computer is unable to fire the shift solenoids correctly (I think), and – BAM – you have a sudden-neutral condition. Why does the voltage jump because of a poor ground? The poorer the ground, the higher the resistance will be in that ground circuit. The higher resistance will cause the voltage in the overdrive or drive position to rise toward the 5-volt reference voltage, much like putting a bend in a garden hose would raise the pressure in the hose behind the bend. Ground-circuit integrity can be verified by placing the positive multimeter lead to the MLPS ground terminal at the MLPS and the negative multimeter lead to the negative battery post, as seen in Figure 4. With the multimeter set to DC volts and the engine running, the maximum voltage should be 0.1 volt. If more than 0.1 volt is seen on this ground circuit, it is **NOT** a good ground. In order to correct this condition, cut the ground wire close to the MLPS, attach it to a known good ground and recheck as previously described. Two things must be remembered here. One is that the return electricity will seek the path of least resistance. This path **MUST** be the ground circuit, **NOT** your multimeter. That's why you should see a maximum of 0.1 volt on any 5-volt-reference ground circuit; 0.3 is acceptable on a 12-volt-reference voltage supply. The second thing to remember is that most electrical-fault phone calls I receive on the ATSG helpline are ground-related problems, so be sure to use the voltage-drop method of checking grounds as described. It may help to prevent you from falling into this trap. Until next time



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