



Technical Service Information

MRMA 5 SPEED ACURA RSX NEUTRALIZING INTO FOURTH GEAR

COMPLAINT: A 2002 Acura RSX using an MRMA 5 speed automatic transmission has come into a shop with a neutralizing going into fourth gear. The scan tool produced a P0780 Shift Malfunction along with P0700 AT System Malfunction. The scan tool also revealed correct shift solenoid firing order, especially third to fourth (Figure 1).

The transmission was rebuilt with all new solenoids. When installed and road rested the original complaint of neutralizing into fourth gear remained. With the shop convinced that an electrical malfunction was the cause, a mobile tech was brought in to diagnose the concern. A multi-trace lab-scope and scan tool was used to test transmission electrical operation. The scope was used to see if the shift solenoids are operated in their proper sequence (Figure 2).

The analysis was the PCM had provided the correct control of the shift solenoids for each gear change per service information shift solenoid application table. When the shift is made into fourth gear, Shift Solenoid C first turns OFF then shift solenoid A turns ON. With particular focus to the on coming solenoid, a current probe confirmed shift solenoid A had pintle movement (Figure 3). Since there are no members inside the transmission that are held by electrical means, it is believed there must be an internal hydraulic or mechanical problem with the 4th gear clutch apply circuit in 4th gear. The transmission shop picks up the vehicle and installs a different transmission, same problem!

CAUSE: The scope is connected again and the vehicle driven to see if there is something that was missed on the initial check. A Pico WPS500 transducer is connected to the transmission port for the 4th gear clutch. The pressure transducer shows the clutch receives pressure in reverse but not 4th gear. It is still believed there is a problem in the valve body. After re-checking the valve body with no answer, the customer tells the transmission shop to replace the PCM. This fixes the vehicle! The transmission shop brings the car back for a follow-up scope test and the problem is finally determined

CORRECTION: *Final analysis:* After performing a follow-up scope of the new computer to compare solenoid shift sequences with the original computer, it is discovered that shift solenoid C did not completely turn off (Figure 4). The PCM provides system voltage to the solenoid through the "High Side Driver-HSD" inside the PCM. When this solenoid is fully energized approximately 13.7 volts can be seen. When the HSD shuts off 0 volts should be observed. A closer look at the scope reading for Shift Solenoid C revealed that when the HSD turned off, voltage dropped to 2.1 volts rather than 0. The solenoid resistance measured 14 ohm. A 14 ohm solenoid being supplied with 2.1 volts equates to a 1.5 amps current draw ($2.1\text{vdc} / 14\text{ ohms} = .15\text{ amps}$). These .15 amps prevented the solenoid's magnetic field from collapsing which simply means it remained ON rather than turning OFF.

Further solenoid to hydraulic activity explained.

When the high side driver inside the PCM energizes shift solenoid C, the applied pressure strokes shift valve C to the left. When the PCM turns off shift solenoid C HSD, there is some residual current, the voltage does not drop to zero, the HSD is defective. This leaves the shift solenoid in the applied position, so the shift valve C cannot return to the right or home position. This prevents the 5G port at shift valve C from connecting to the 56 port of the shift valve C, so 4th gear clutch apply pressure from linear solenoid B cannot reach the clutch, hence the transmission neutrals. The new PCM solenoid C HSD turns off properly, hence the problem is gone.

Special thanks to Scot Manna from M. B. Automotive in Chicago (847) 824-1190



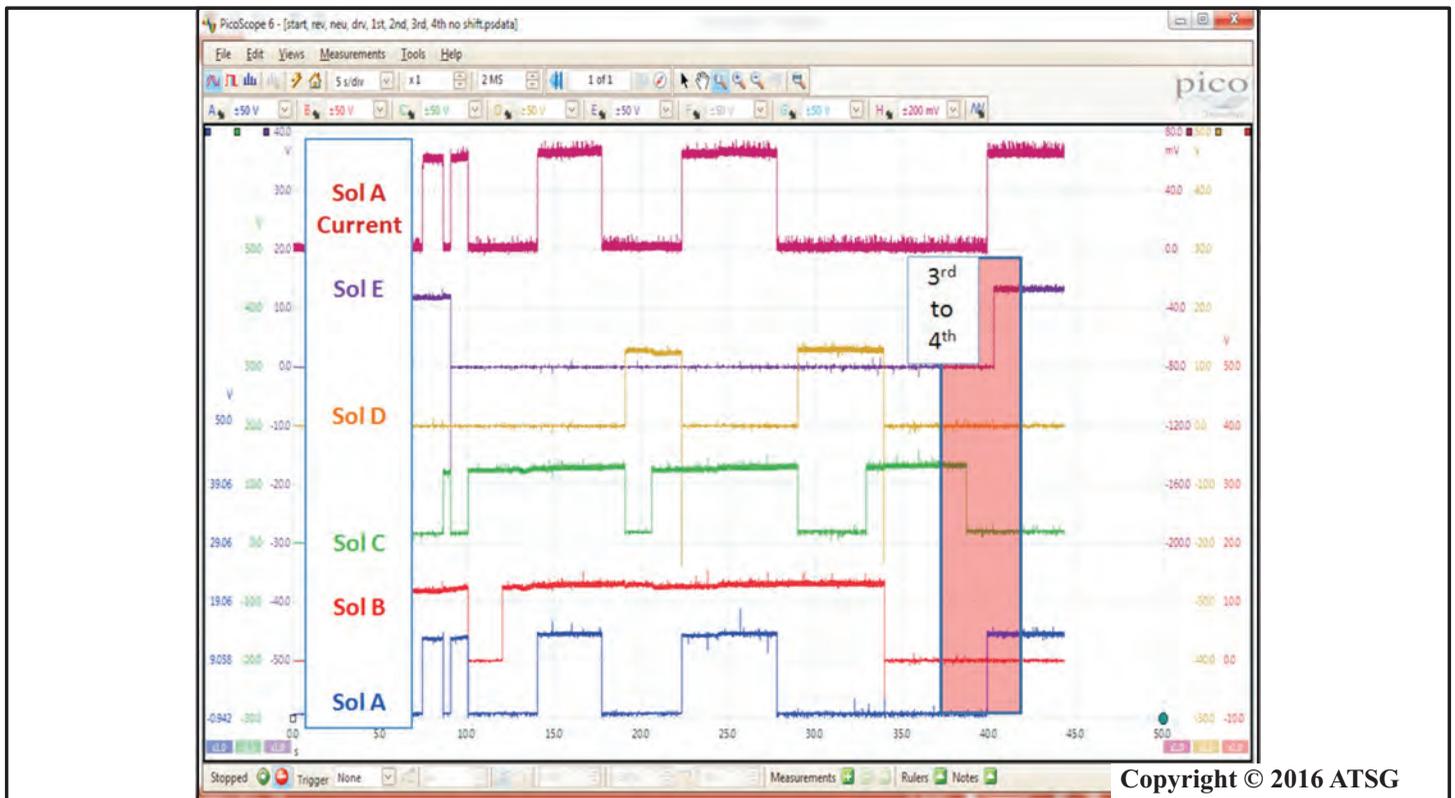
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POSITION	GEAR POSITION	SHIFT SOLENOIDS				
		A	B	C	D	E
D, D3, M	Shifting from N position	OFF	ON	ON	OFF	OFF
	1st Gear	ON	ON	ON	OFF	OFF
	1st to 2nd shift transition	OFF	ON	ON	OFF	OFF
	2nd Gear	OFF	ON	OFF	ON	OFF or ON
	2nd to 3rd shift transition	OFF	ON	ON	ON	OFF or ON
D, M	3rd Gear	OFF	OFF	ON	OFF	OFF or ON
	3rd to 4th shift transition	OFF	OFF	OFF	OFF	OFF or ON
	4th Gear	ON	OFF	OFF	OFF	OFF or ON
	4th to 5th shift transition	ON	OFF	OFF	ON	OFF or ON
	5th Gear	ON	OFF	ON	ON	OFF or ON

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Figure 1



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Figure 2



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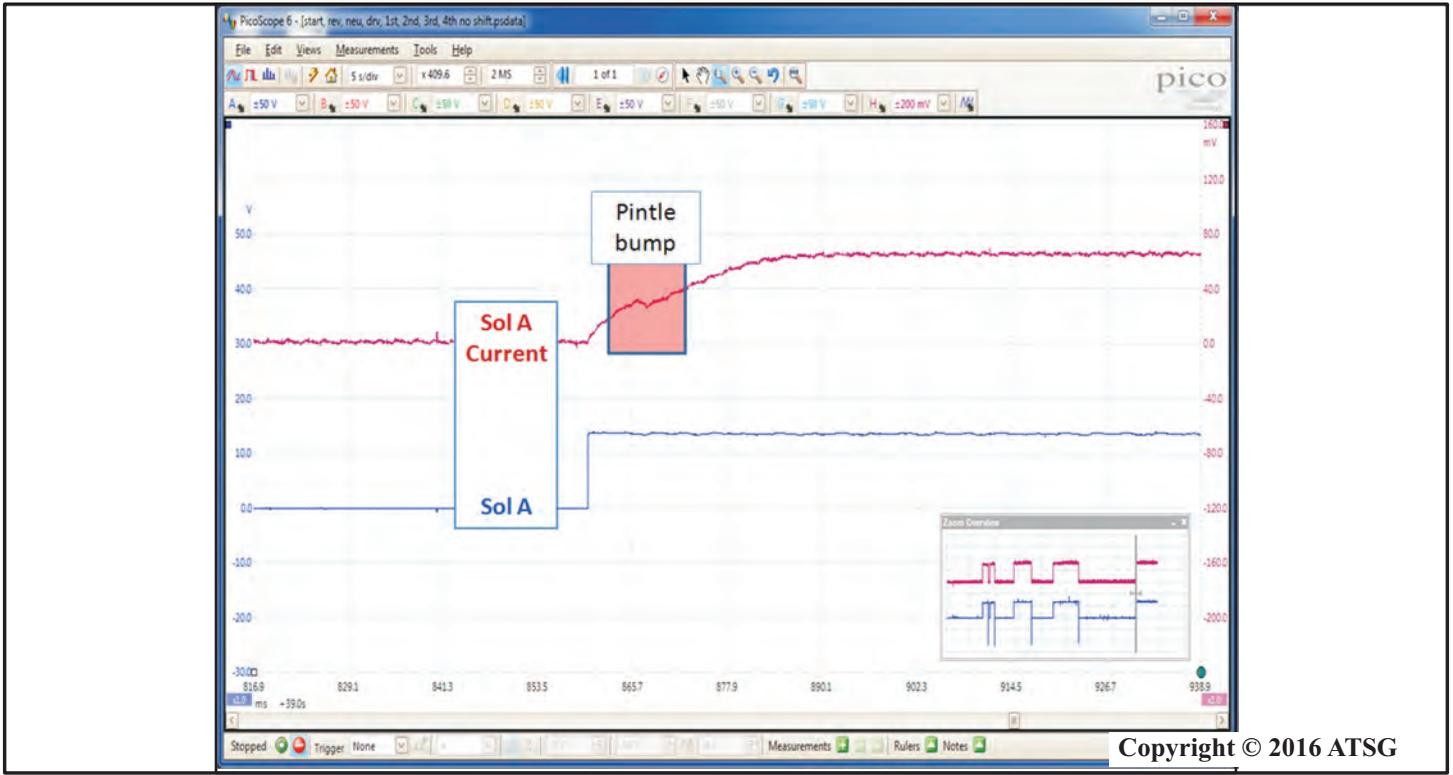


Figure 3

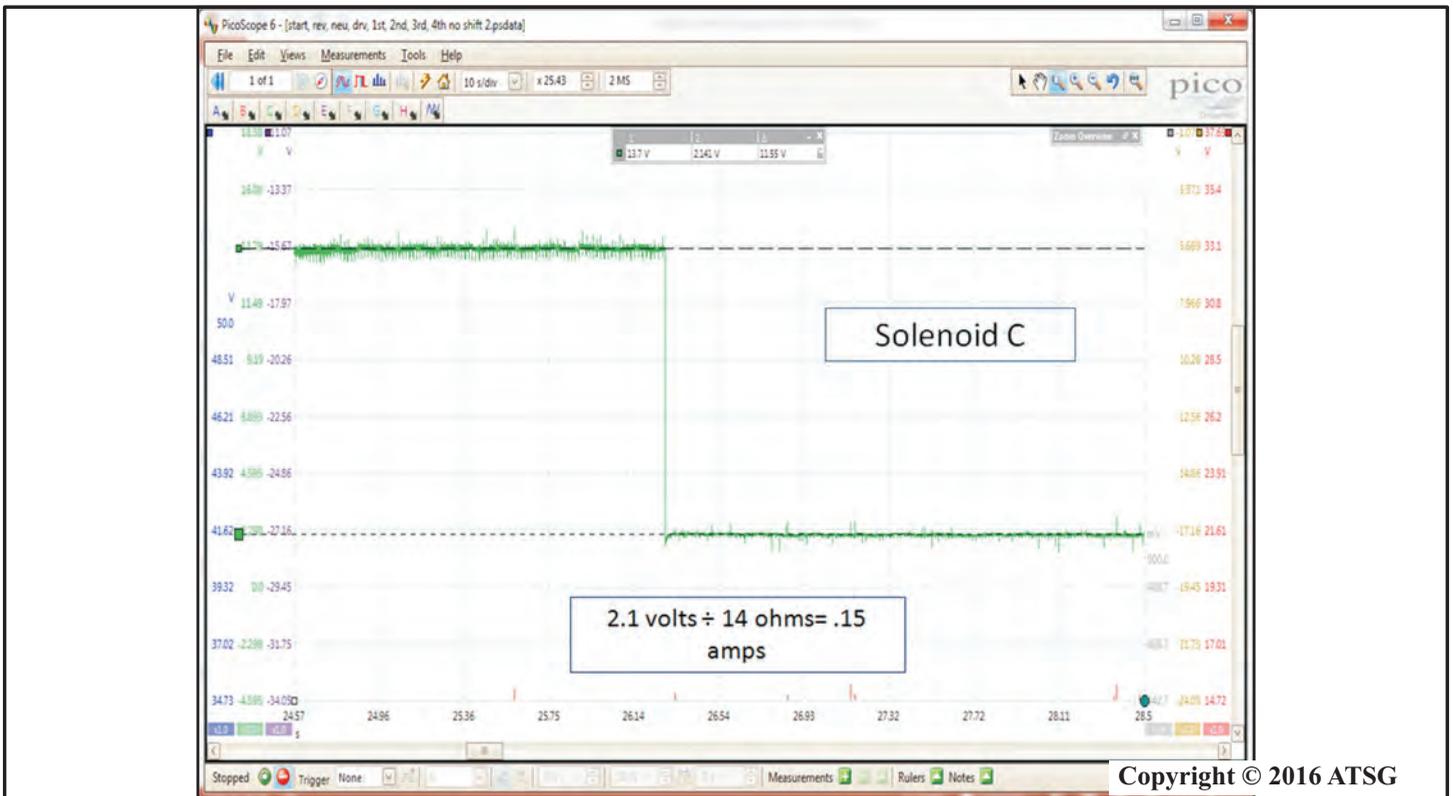


Figure 4