

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text

1993 Mazda 929

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ARTICLE BEGINNING

AUTOMATIC TRANSMISSIONS

Mazda RA4A-EL & RB4A-EL Diagnosis

APPLICATION

TRANSMISSION APPLICATION

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Vehicle	Transmission Model
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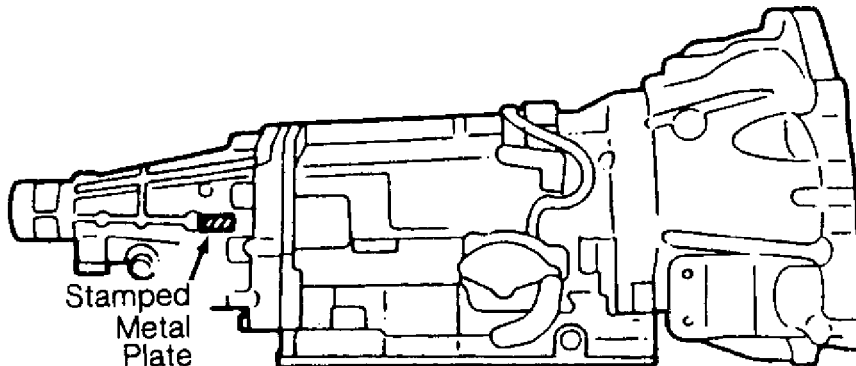
RX-7 (1991-94)	RB4A-EL
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929 (1992-94)	RA4A-EL
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IDENTIFICATION

Transmission model number is identified by a stamped metal plate attached to right side of transmission case. See Fig. 1.



93G23156

Fig. 1: Locating Transmission Identification Number
Courtesy of Mazda Motors Corp.

DESCRIPTION & OPERATION

RA4A-EL and RB4A-EL are electrically controlled, 4-speed overdrive units. These units use 3-element lock-up torque converter and 2 planetary gear sets. A Powertrain Control Module Transmission (PCMT) unit controls all shifts according to road speed and throttle position.

The PCMT has 2 shift programs (modes) to choose from, ECONOMY and POWER. In the RX7 & 929, modes can be manually selected from a switch by the driver. These models are equipped with a Hold switch. The Hold switch will cause transmission to remain in selected gear position. If Hold switch is depressed while in 3rd gear, transmission will downshift to 2nd on decel and upshift back to 3rd on acceleration and hold in 3rd gear.

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The PCMT includes a self-diagnostic system, which diagnoses circuit problems of input sensors, solenoid valves and PCMT. Trouble codes are stored in the PCMT. The PCMT tester and adapter are used to access trouble codes.

LUBRICATION & ADJUSTMENT

LUBRICATION & ADJUSTMENT

See the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section. Refer to the following:

- * For RX7, see TRANSMISSION SERVICING - A/T
- * For 929, see TRANSMISSION SERVICING - A/T

SHIFT-LOCK SYSTEM

OPERATION

All models are equipped with a shift-lock system. System locks gear selector in Park unless brake pedal is pushed down. Shift-lock actuator uses an integral relay to release a solenoid (mounted on gear selector assembly).

A mechanical control cable prevents ignition key from being removed unless gear selector is in Park. With ignition key removed, gear selector locks in Park.

FUNCTIONAL CHECK

1) With ignition key removed, ensure gear selector cannot be moved from Park. Insert key in ignition switch.

2) Turn ignition on. Ensure gear selector can only be moved with brake pedal pressed down. Move gear selector to Reverse.

3) Ensure ignition key cannot be removed. Move gear selector to Park. Ensure it is now possible to remove ignition key.

4) If shift-lock system does not operate as described, check gear selector, shift-lock solenoid and control cable.

5) Place gear selector in Park. Using screwdriver, push down the emergency override button on shifter console and verify gear selector can be moved from Park position. See Fig. 2. If gear selector cannot be moved out of Park, adjust or replace shift-lock actuator. To adjust shift-lock actuator, refer to the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section. Refer to the following:

- * For RX7, see TRANSMISSION SERVICING - A/T
- * For 929, see TRANSMISSION SERVICING - A/T

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- 1) Disconnect negative battery cable. Remove gear selector console cover. Disconnect "P" range switch connector. See Fig. 4.
- 2) Place gear selector in Park. Continuity should be present between wires. Depress gear selector release button and ensure no continuity is present. If "P" range switch works as described, go to next step. If "P" range switch does not work as described, replace "P" range switch.
- 3) Turn ignition on. Check for constant battery voltage between terminals "A" and "B", and terminals "A" and "C". See Fig. 5.

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Check for battery voltage between terminal "D" and "C". Battery voltage should be present with brake pedal depressed.

4) Disconnect shift-lock actuator connector and turn ignition off. Test for continuity between terminal "C" and ground. If voltage or continuity is not as described, repair wire harness and/or replace shift-lock actuator.

SHIFT-LOCK CONTROL UNIT CONNECTOR I.D. (929)

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Connector I.D. Wire Color

A Blue/Red

B Black/Yellow

C Black

D White/Green

AA

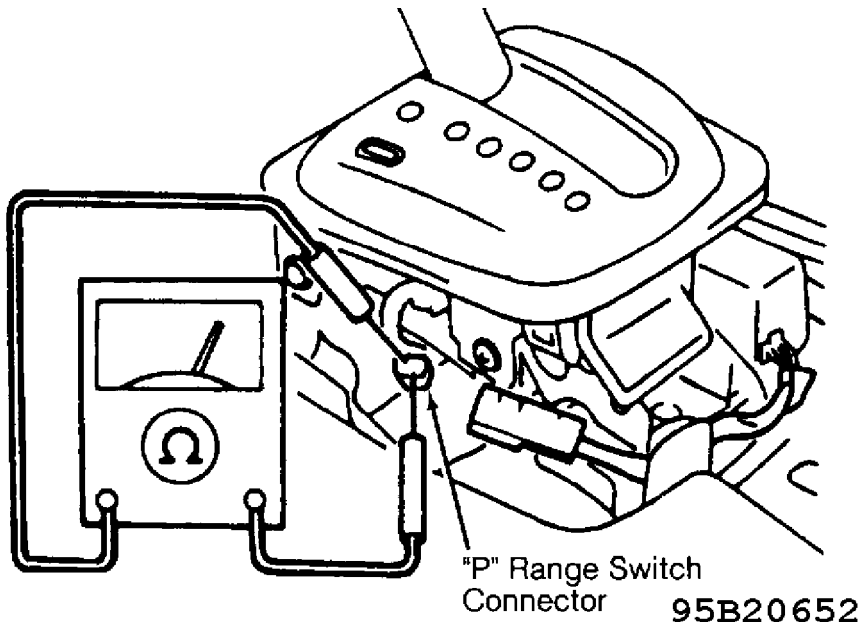


Fig. 4: Testing 929 "P" Range Switch
Courtesy of Mazda Motors Corp.

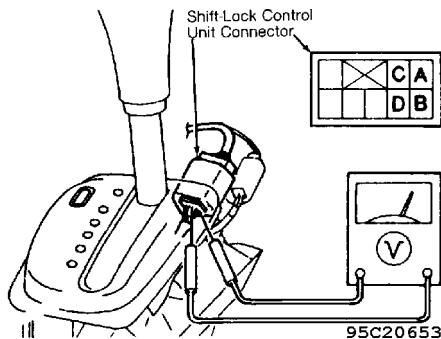


Fig. 5: Testing 929 Shift Lock Actuator
Courtesy of Mazda Motors Corp.

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TROUBLE SHOOTING

NOTE: For clutch, band, one-way clutch and overrunning clutch operation, see ELEMENTS IN USE under TESTING.

System problems may be caused by engine, PCMT, hydraulic control system or electronic control system. When trouble shooting, start with those points that can be inspected quickly and easily. Recommended trouble shooting sequence is as follows:

- * Check for fault codes. See ELECTRONIC SELF-DIAGNOSTICS. If fault code is present, see appropriate TROUBLE CODE CHARTS.
- * Check stall speed, time lag, line pressure and throttle pressure. See TESTING.
- * Road test vehicle and check for proper transmission operation. See ROAD TEST.

If previous trouble shooting sequence is followed, cause of the problem should be located. Another way to find PCMT problems is to use the QUICK DIAGNOSIS & TROUBLE SHOOTING CHART to find the correct test. These charts show various problems and relationship of components that might be cause of problem.

Using Quick Diagnosis Chart

1) Components listed under Self-Diagnosis are identified by PCMT self-diagnosis function. Components listed under adjustment indicate problem may be the result of an incorrect adjustment. Check adjustment of each component listed and readjust as necessary.

2) Use electronic tester to check input and output signals of components listed under Tester. Components listed under Stall Test may be checked by results of stall test procedure. To perform stall test, see STALL SPEED under TESTING.

3) Components listed under Time Lag Test may be checked by time lag test. To perform time lag test, see TIME LAG under TESTING.

4) Components listed under Road Test may be checked using the results of the road test. To perform the road test, see ROAD TEST. For appropriate trouble shooting chart testing procedures, refer to the QUICK DIAGNOSIS & TROUBLE SHOOTING CHART DIRECTORY table.

Using Trouble Shooting Chart

Use trouble shooting chart to diagnose a problem by symptom. See the QUICK DIAGNOSIS & TROUBLE SHOOTING CHART DIRECTORY.

QUICK DIAGNOSIS & TROUBLE SHOOTING CHART DIRECTORY

AAAAAAAAAAAAAAAAAAAAAAAA-AAAAAAAAAAAAAAAAAAAAAAAA

Application

See Fig.

Quick Diagnosis Chart

RX7 & 929 (RA4A-EL & RB4A-EL) 6

Trouble Shooting Chart

RX7 (RB4A-EL) 7

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929 (RA4A-EL)

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Item	Possible parts	Preliminary								Electronic system														Hydraulic control system					Powertrain																																												
		ATF level and condition	Selector lever and control linkage	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Park/Neutral switch	Throttle position sensor	VSS 1 (revolution sensor)	VSS 2 (speedometer sensor)	Engine rpm sensor (Ne1 signal)	ATF thermosensor	Solenoid valve (shift A)	Solenoid valve (shift B)	Solenoid valve (line pressure)	Dropping resistor	Solenoid valve (lockup)	Solenoid valve (lockup control)	Solenoid valve (overrunning clutch)	Vehicle speed pulse generator	Inhibitor signal	Idle switch	ODT inhibit signal (ASC signal)	Hold switch	A/C signal	Barometric absolute pressure sensor	Torque reduced signal	Reduce torque signal	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism																								
Self-diagnosis		○	○	○						○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○	○																																													
Adjustment		○	○	○						○	○	○	○	○	○	○	○	○	○	○	○	○	○																																																		
EC-AT tester								○	○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○	○																																														
Stall test																																		○																																							
Time lag test																																																																									
Line pressure test																																																																									
Road test																																																																									

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Fig. 6: Quick Diagnosis Chart - RX7 & 929 (RA4A-EL & RB4A-EL)
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Fig. 7: Trouble Shooting Chart - RX7 (RB4A-EL)
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		Preliminary																										
		Preliminary							Electronic system										Hydraulic control system							Powertrain		
Possible		ATF level and condition	Selector lever and control linkage	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Park/Neutral switch	Throttle position sensor	VSS1 (revolution sensor)	VSS2 (speedometer sensor)	Engine fan sensor (fan signal)	ATF temperature	Solenoid valve (shift A)	Solenoid valve (shift B)	Solenoid valve (line pressure)	Dropping resistor	Solenoid valve (lockup)	Solenoid valve (lockup control)	Solenoid valve (overrunning clutch)	Vehicle speed pulse generator	Inhibitor signal	Idle switch	O/D inhibit signal (ASC signal)	Hold switch	A/C signal
Troubleshooting item		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Accelerating	Vehicle does not move in D, S, L, and R ranges	1	4					2	3	7								5	6									
	① Vehicle does not move in D, and S ranges	1																										
	② Vehicle does not move in R range	1						2											3	4								
	③ Vehicle does not move in D, S, and L ranges	1						2											3	4								
	Vehicle moves in N range	1	3					2		8									4	5								
	Vehicle moves in P range, or parking gear does not disengage when P disengaged	1								2																		
	Excessive creep	1	3					2	9	6									4	5								
	No creep at all	1	3					2		6									4	5								
	Low maximum speed and poor acceleration	1						2	7	10	6	12							8	9	4	6						
	No shift							1		5									2	3								
Shifting	① Does not shift from 1st to 2nd									4									2	3								
	② Does not shift from 2nd to 3rd									2									1									
	③ Does not shift from O/D to 3rd																											
	Does not shift to O/D									5	8								1	2	3							
	① Does not shift from O/D to 2nd or from 3rd to 2nd	1						6		2									3	4								
	② Does not shift from 3rd to 1st or from 2nd to 1st	1						6		2									3	4								
	Abnormal shift	1								2	3																	
	① Shifts directly from 1st to 3rd	1																										
	② Does not kickdown when accelerator is depressed in O/D within kickdown range										1	2							3	4								
	③ Excessive engine speed when accelerated in O/D due to delayed kickdown										2	1							3	4								
Slipping	Frequent shifting									1																		
	Shift point high or low									1	3	2																
	① Lockup point high or low										1	3																
	No lockup									7	4	8	6	3														
	No kickdown									1	5									2	3							
	Engine flares up or slips when accelerating vehicle	1	3					2		6										4	5							
	① Slips when shifting from 1st to 2nd	1	2					10	3	6	8									4	5							
	② Slips when shifting from 2nd to 3rd	1	2					10	3	6	8									4	5							
	③ Slips when shifting from 3rd to O/D	1	2					10	3	6	8									4	5							
	Engine flares up or slips when shifting from O/D to 3rd	1	2					8	3	6										4	5							
Shift shock	Engine flares up or slips when shifting from O/D to 2nd	1	2					9	3	6										4	5							
	Engine flares up or slips when shifting from 3rd to 2nd	1	2					8	3	6										4	5							
	Engine flares up or slips when shifting from O/D or 3rd to 1st	1	2					7	3	6										4	5							
	Engine flares up or slips when upshifting or downshifting	1	3					2		6	6									4	5							
	Shudders upon lockup	2	1					4		7	10	9								5	6	3						
	Excessive N to D or N to R range shift shock	1	2					4		3	10	7								5	6							
	Excessive shift shock when upshifting and downshifting	1						3		2	6	10								4	5							
	① Excessive 1st to 2nd shift shock							11	1		4	7	5							2	3							
	② Excessive 2nd to 3rd shift shock							11	1		4	7	5							2	3							
	③ Excessive 3rd to O/D shift shock							9	1		4	7	5							2	3							
Noise	Excessive 2nd to 1st shift shock in L range							11	1		4	7	5							2	3							
	Shift shock when accelerator released and deceleration occurs							2			5	8	6							3	4							
	Excessive lockup shift shock	1								3	7	6								2								
	Noise at idle when vehicle stopped in all ranges	1								4	5	6								2	3							
	Noise at idle when vehicle stopped in R, D, S, and L ranges	1																										
	No engine braking	1								5	3																	
	No mode changes from/to hold mode																											
	Transmission overheats	1						3	2		6									4	5	7	8					
	Hold indicator lamp flashes										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Engine does not start in N or P range, or starts in other ranges	3	2							1																		
Others	Engine stalls when shifted to R, D, S, and L ranges									3	5																	
	① Rough idle when R, D, S, and L ranges selected from N and P ranges										3																	
	Engine stalls when driving at low speed or stopping	1	2							4	8																	

Fig. 8: Trouble Shooting Chart - 929 (RA4A-EL)

Courtesy of Mazda Motors Corp.

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ROAD TEST

Preparation

Check all fluid levels and make corrections as necessary.

Warm engine and transmission to operating temperature. If any problems occur during the road test, refer to ELECTRONIC SELF-DIAGNOSTICS and TESTING, or repair transmission.

"D" RANGE

NOTE: NORMAL/POWER mode are controlled by the PCMT.

Inspection

1) Check for shift point, shift pattern and shift shock. Shift selector to "D" range. Accelerate vehicle at half and full throttle, ensure 1-2, 2-3 and 3-OD upshifts, downshifts and lock-up are obtained. Note speed and compare with appropriate SHIFT SPEED CHARTS. See Figs. 9 and 10. Note upshifts for shift shock and slippage.

2) When driving in OD, shift to "S" and check that OD-3 downshift occurs immediately.

3) Select HOLD mode. Check for 2-3 up and downshifts and lock-up and no 1st or "OD".

4) Decelerate vehicle. Check for engine braking in 3rd and 2nd gears when throttle is open 1/8 or less.

5) Drive in 3rd and 4th gear to ensure no unusual noise or vibration is heard. Check torque converter, driveshaft(s) and differential for source of unusual noise. Ensure kickdown operates properly and shift points match appropriate SHIFT SPEED CHARTS. See Figs. 9 and 10.

NOTE: Throttle sensor voltage of PCMT tester represents throttle opening. OD does not operate when ATF temperature is below 50°F (10°C), when cruise control is operating with a 5 MPH difference between preset cruise speed and vehicle speed on all 1994 models and 1993 RX7 and 13 MPH difference on remaining 1993 models. Lock-up does not operate when throttle is closed with vehicle below 74 MPH or when ATF is below 104°F (40°C).

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Range	Mode	Throttle condition (throttle sensor voltage)	Shift	Vehicle speed km/h (MPH)
D	POWER	Fully open (4.0–4.5V)	D ₁ → D ₂	50–56 {31–35}
			D ₂ → D ₃	103–111 {64–69}
			D ₃ → O/D	178–188 {111–117}
		Half throttle	D ₁ → D ₂	35–41 {22–25}
			D ₂ → D ₃	81–93 {50–58}
			D ₃ → O/D	126–144 {78–89}
			Lockup ON (D ₃)	94–106 {58–66} {81–93 {50–58}}
			Lockup ON (O/D)	174–192 {108–119} {126–144 {78–89}}
		Fully closed (0.1–1.1V)	O/D → D ₃	39–45 {24–28}
			D ₃ → D ₂	13–19 {8–12}
			D ₂ → D ₁	5–11 {3–7}
		Kickdown	O/D → D ₃	142–152 {88–94}
			D ₃ → D ₂	91–99 {57–62}
			D ₂ → D ₁	38–44 {24–27}
	NORMAL A/C ON	Fully open (4.0–4.5V)	D ₁ → D ₂	50–56 {31–35}
			D ₂ → D ₃	103–111 {64–69}
			D ₃ → O/D	178–188 {111–117}
		Half throttle	D ₁ → D ₂	32–38 {20–24}
			D ₂ → D ₃	80–92 {50–57}
			D ₃ → O/D	126–144 {78–89}
			Lockup ON (D ₃)	94–106 {58–66} {80–92 {50–57}}
			Lockup ON (O/D)	174–192 {108–119} {126–144 {78–89}}
		Fully closed (0.1–1.1V)	O/D → D ₃	39–45 {24–28}
			D ₃ → D ₂	13–19 {8–12}
			D ₂ → D ₁	5–11 {3–7}
		Kickdown	O/D → D ₃	142–152 {88–94}
			D ₃ → D ₂	91–99 {57–62}
			D ₂ → D ₁	38–44 {24–27}
	NORMAL A/C OFF	Fully open (4.0–4.5V)	D ₁ → D ₂	50–56 {31–35}
			D ₂ → D ₃	103–111 {64–69}
			D ₃ → O/D	178–188 {111–117}
		Half throttle	D ₁ → D ₂	32–38 {20–24}
			D ₂ → D ₃	80–92 {50–57}
			D ₃ → O/D	126–144 {78–89}
			Lockup ON (D ₃)	94–106 {58–66} {80–92 {50–57}}
			Lockup ON (O/D)	174–192 {108–119} {126–144 {78–89}}
		Fully closed (0.1–1.1V)	O/D → D ₃	32–38 {20–24}
			D ₃ → D ₂	13–19 {8–12}
			D ₂ → D ₁	5–11 {3–7}
		Kickdown	O/D → D ₃	142–152 {88–94}
			D ₃ → D ₂	91–99 {57–62}
			D ₂ → D ₁	38–44 {24–27}
D	HOLD	–	O/D → D ₃	180–186 {112–116}
			D ₃ → D ₂	7–13 {4–8}
			D ₂ → D ₃	15–25 {9–16}
			Lockup ON (D ₃)	94–106 {58–66} {39–51 {24–32}}
S	EXCEPT HOLD	Fully open (4.0–4.5V)	S ₁ → S ₂	50–56 {31–35}
			S ₂ → S ₃	103–111 {64–69}
			S ₃ → S ₂	35–41 {22–25}
		Half throttle	S ₂ → S ₃	81–93 {50–58}
			Lockup ON (S ₃)	94–106 {58–66} {81–93 {50–58}}
		Fully closed (0.1–1.1V)	S ₃ → S ₂	13–19 {8–12}
			S ₂ → S ₁	5–11 {3–7}
		Kickdown	S ₃ → S ₂	91–99 {57–62}
			S ₂ → S ₁	38–44 {24–27}
		HOLD	–	112–118 {70–73}
L	EXCEPT HOLD	Fully open (4.0–4.5V)	L ₁ → L ₂	50–56 {31–35}
		Half throttle	L ₁ → L ₂	35–41 {22–25}
		Fully closed (0.1–1.1V)	L ₂ → L ₁	5–11 {3–7}
		Kickdown	L ₂ → L ₁	38–44 {24–27}
	HOLD	–	L ₂ → L ₁	45–51 {28–32}

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Fig. 9: RX7 Shift Speed Chart
Courtesy of Mazda Motors Corp.

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Range	Mode	Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {mph}
D	POWER	Fully open (3.0—4.3V)	D ₁ →D ₂	49—55 {30—34}
			D ₂ →D ₃	94—102 {58—63}
			D ₃ →O/D	152—162 {94—100}
		Half throttle (1.7—2.7V)	D ₁ →D ₂	40—46 {25—29}
			D ₂ →D ₃	79—91 {49—56}
			D ₃ →O/D	133—151 {82—94}
			Lockup ON (D ₃)	94—106 {58—66}
			Lockup ON (O/D)	144—162 {89—100}
			O/D→D ₃	24—30 {15—19}
		Fully closed (0.1—1.1V)	D ₃ →D ₂	12—18 {7—11}
			D ₂ →D ₁	5—11 {3—7}
			O/D→D ₃	142—152 {88—94}
		Kickdown	D ₃ →D ₂	87—95 {54—59}
			D ₂ →D ₁	43—49 {27—30}
			D ₁ →D ₂	49—55 {30—34}
	NORMAL A/C ON	Fully open (3.0—4.3V)	D ₂ →D ₃	94—102 {58—63}
			D ₃ →O/D	152—162 {94—100}
			D ₁ →D ₂	40—46 {25—29}
		Half throttle (1.7—2.7V)	D ₂ →D ₃	79—91 {49—56}
			D ₃ →O/D	129—147 {80—91}
			Lockup ON (D ₃)	94—106 {58—66}
			Lockup ON (O/D)	144—162 {89—100}
		Fully closed (0.1—1.1V)	O/D→D ₃	24—30 {15—19}
			D ₃ →D ₂	12—18 {7—11}
			D ₂ →D ₁	5—11 {3—7}
		Kickdown	O/D→D ₃	142—152 {88—94}
			D ₃ →D ₂	87—95 {54—59}
			D ₂ →D ₁	43—49 {27—30}
	NORMAL A/C OFF	Fully open (3.0—4.3V)	D ₁ →D ₂	49—55 {30—34}
			D ₂ →D ₃	94—102 {58—63}
			D ₃ →O/D	152—162 {94—100}
		Half throttle (1.7—2.7V)	D ₁ →D ₂	40—46 {25—29}
			D ₂ →D ₃	79—91 {49—56}
			D ₃ →O/D	129—147 {80—91}
			Lockup ON (D ₃)	94—106 {58—66}
			Lockup ON (O/D)	144—162 {89—100}
		Fully closed (0.1—1.1V)	O/D→D ₃	24—30 {15—19}
			D ₃ →D ₂	12—18 {7—11}
			D ₂ →D ₁	5—11 {3—7}
		Kickdown	O/D→D ₃	142—152 {88—94}
			D ₃ →D ₂	87—95 {54—59}
			D ₂ →D ₁	43—49 {27—30}
D	HOLD	—	O/D→D ₃	154—160 {95—99}
			D ₃ →D ₂	7—13 {4—8}
			D ₂ →D ₃	15—25 {9—16}
			Lockup ON (D ₃)	94—106 {58—66}
S	NORMAL	Fully open (3.0—4.3V)	S ₁ →S ₂	49—55 {30—34}
			S ₂ →S ₃	94—102 {58—63}
		Half throttle (1.7—2.7V)	S ₁ →S ₂	40—46 {25—29}
			S ₂ →S ₃	79—91 {49—56}
		Fully closed (0.1—1.1V)	Lockup ON (S ₃)	94—106 {58—66}
			S ₃ →S ₂	12—18 {7—11}
		Kickdown	S ₂ →S ₁	5—11 {3—7}
			S ₃ →S ₂	87—95 {54—59}
	HOLD	—	S ₂ →S ₁	43—49 {27—30}
			S ₃ →S ₂	95—101 {59—63}
L	NORMAL	Fully open (3.0—4.3V)	L ₁ →L ₂	49—55 {30—34}
		Half throttle (1.7—2.7V)	L ₁ →L ₂	40—46 {25—29}
		Fully closed (0.1—1.1V)	L ₂ →L ₁	5—11 {3—7}
		Kickdown	L ₂ →L ₁	43—49 {27—30}
	HOLD	—	L ₂ →L ₁	45—51 {28—32}

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Fig. 10: 929 Shift Speed Chart
Courtesy of Mazda Motors Corp.

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"D" RANGE RESULTS

Starts In "S" Or Shifts Directly From "L" To "OD"
Stuck shift solenoid "A". Stuck shift valve "A".

Starts In "OD"
Stuck shift valve "B". Stuck shift solenoid "B".

No Shift
Stuck shift solenoid "A" and/or "B", or stuck shift valve "A"
and/or "B".

Incorrect Shift Points
Throttle sensor out of adjustment. Speed sensor No. 1 not
operating properly.

Shift Shock Or Slipping Is Felt
Stuck line pressure solenoid. Accumulator not operating
properly. Throttle sensor out of adjustment. Speed sensor No. 1 not
operating properly. ATF thermosensor not operating properly. Worn
clutches, one-way clutches and/or brakes.

No Engine Braking
Stuck overrunning clutch solenoid. Worn clutches and/or
brakes.

No Lock-Up Shift
Stuck lock-up solenoid. Stuck lock-up control valve.

KICKDOWN

Drive vehicle and check for OD-3, OD-2, OD-1, 3-2, 3-1 and 2-
1 kickdown. See appropriate SHIFT SPEED CHARTS. See Figs. 9 and 10.

"S" RANGE

1) Select "S" mode. Accelerate vehicle, check 1-2 and 2-3 up
and downshift with lock-up and no OD. Decelerate vehicle, check for
engine braking in 3rd and 2nd gears with throttle open 1/8 and less.

2) Drive in "S" mode and ensure 3rd gear is held until 3-2
downshift point is achieved. Accelerate in "S" HOLD mode and ensure
that 2nd gear is held. Decelerate vehicle, check for engine braking
with throttle open 1/8 and less.

"L" RANGE

1) Select "L" mode. Accelerate vehicle, ensure 1-2 upshifts
and downshifts are made and no 3rd gear, OD or lock-up occurs.
Decelerate vehicle and check for engine braking in 1st and 2nd gears.

2) Drive vehicle with gear selector in "D" HOLD (3rd gear),
shift to "L" and ensure 3rd gear is held until 3-2 downshift point is
reached, then 2nd gear is held until 2-1 downshift point is reached.

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3) Accelerate vehicle in "L" HOLD and ensure 1st gear is held. Decelerate vehicle and check for engine braking.

ELEMENTS IN USE

NOTE: For diagnosing clutch, band, one-way clutch and overrunning clutch operation, see appropriate ELEMENTS IN USE chart. See Figs. 11 and 12.

Range	Mode	Gear	Shift	Reverse clutch	High clutch	Forward clutch	Overrunning clutch	Band servo piston			Forward OWC	Low OWC	Low and reverse brake
								2nd applied	3rd released	O/D applied			
P	-	-	-										
R	-	Reverse	-	○									○
N	-	-	-										
D	Except HOLD	1st	↑			○	■				●	●	
		2nd	↑			○	*3 ■	○			●		
		3rd	↑		○	○	*3 ■	*1 ⊗	⊗		●		
		O/D	↑		○	⊗		*2 ⊗	⊗	○			
	HOLD	2nd	↑			○	*3 ⊗	○			●		
		3rd	↑		○	○	*3 ⊗	*1 ⊗	⊗		●		
		*4 O/D	↑		○	⊗		*2 ⊗	⊗	○			
S	Except HOLD	1st	↑			○	Δ				●	●	
		2nd	↑			○	*3 Δ	○			●		
		3rd	↑		○	○	*3 Δ	*1 ⊗	⊗		●		
	HOLD	2nd	↑			○	*3 Δ	○			●		
		*4 3rd	↑		○	○	*3 Δ	*1 ○	⊗		●		
L	Except HOLD	1st	↑			○	*3 ○				●	●	○
		2nd	↑			○	*3 ○	○			●		
	HOLD	1st	↑			○	*3 ○				●	●	○
		*4 2nd	↑			○	*3 ○	○			●		

OWC: one-way clutch

*1: Hydraulic pressure is applied to both 2nd applied side and 3rd released side of band servo piston.

However, because area of 3rd released side is larger than 2nd applied side, the brake band does not engage.

*2: Hydraulic pressure is applied to O/D applied side in the above conditions (*1) and brake band engages.

*3: Indicates that engine braking is available as a result of operation of overrunning clutch.

*4: Prevents engine overspeed.

○: Constantly engaged.

●: Operates when accelerated.

Δ: Engaged when throttle opening is below approximately 1/8.

○: Engaged when vehicle speed is above approximately 10 km/h {6.2 mph} and throttle opening is below approximately 1/8.

■: Engaged when O/D inhibit signal (ASC signal) is ON and vehicle speed is above approximately 10 km/h {6.2 mph} and throttle opening is below approximately 1/8.

⊗: Engaged, however does not transmit power.

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Fig. 11: RX7 & 1993 929 Elements In Use

Courtesy of Mazda Motors Corp.

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Range	Mode	Gear	Shift	Reverse clutch	High clutch	Forward clutch	Overrunnng clutch	Band servo piston			Forward OWC	Low OWC	Low and reverse brake
								2nd applied	3GR released	4GR applied			
P	-	-	-										
R	-	Reverse	-	○									○
N	-	-	-										
D	Except HOLD	1	↕			○					●	●	
		2	↕			○		○			●		
		3	↕		○	○		*1 ○	○		●		
		4	↕		○	○		*2 ○	○	○			
	HOLD	2	↕			○	*3 ○	○			●		
		3	↕		○	○	*3 ○	*1 ○	○		●		
		*4 4	↕		○	○		*2 ○	○	○			
S	Except HOLD	1	↕			○	Δ				●	●	
		2	↕			○	*3 Δ	○			●		
		3	↕		○	○	*3 Δ	*1 ○	○		●		
	HOLD	2	↕			○	*3 Δ	○			●		
		*4 3	↕		○	○	*3 Δ	*1 ○	○		●		
L	Except HOLD	1	↕			○	*3 ○				●	●	○
		2	↕			○	*3 ○	○			●		
	HOLD	1	↕			○	*3 ○				●	●	○
		*4 2	↕			○	*3 ○	○			●		

OWC: one-way clutch

*1: Hydraulic pressure is applied to both 2nd applied side and Third gear released side of band servo piston.

However, because area of Third gear released side is larger than 2nd applied side, the brake band does not engage.

*2: Hydraulic pressure is applied to Fourth gear applied side in the above conditions (*1) and brake band engages.

*3: Indicates that engine braking is available as a result of operation of overrunning clutch.

*4: Prevents engine overspeed.

○: Constantly engaged.

●: Operates when accelerated.

Δ: Engaged when throttle opening is below approximately 1/8.

○: Engaged when vehicle speed is above approximately 10 km/h {6.2 mph} and throttle opening is below approximately 1/8.

○: Engaged, but does not transmit power.

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Fig. 12: 1994 929 Elements In Use

Courtesy of Mazda Motors Corp.

ELECTRONIC SELF-DIAGNOSTICS

Self-diagnostic system is integrated in PCMT and diagnoses faulty sensors (input devices), solenoid valves (output devices) and transaxle operation. Fault codes stored in PCMT identify specific components.

Codes may be retrieved from PCMT by using HOLD indicator light. Codes may be retrieved from PCMT by using OEM tester or aftermarket scan tester. See appropriate procedure.

NOTE: OEM tester may also be referred to as Electronic Controlled-Automatic Transmission (EC-AT) tester in trouble code charts.

RETRIEVING FAULT CODES

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HOLD Indicator Light Procedure (RX7 & 929)

1) Locate Data Link Connector (DLC) underhood forward of left strut. Short together GND and TAT terminals of DLC and turn ignition on. See Fig. 13. Warning codes are flashed on HOLD indicator light on dash. Codes are flashed in numerical order if more than one code is present.

2) Note trouble code numbers. See TROUBLE CODE IDENTIFICATION CHARTS. Perform appropriate diagnostic code chart. Refer to the appropriate TROUBLE CODE CHARTS. After repairs are made, clear codes by disconnecting negative battery cable for 20 seconds.

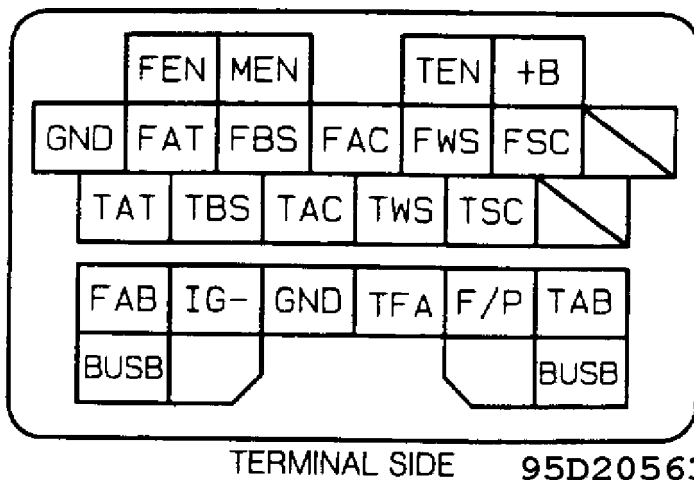


Fig. 13: Locating DLC GND & TAT Terminals
Courtesy of Mazda Motors Corp.

OEM Tester Hook-Up

1) Use manufacturer's instructions on connecting Self-Diagnosis checker and SST, selector and tester harness. Connect OEM tester assembly to DLC located underhood forward of left strut.

2) Set system selector system select switch to position 2. Set test switch to SELF TEST position. See Fig. 14.

NOTE: If using aftermarket scan tester, follow manufacturers procedures.

Retrieval Procedures

1) Connect OEM tester to appropriate positions. See OEM TESTER HOOK-UP. See Fig. 14.

2) Turn ignition on, if "88" flashes on digital display and buzzer sounds for 3 seconds, go to step 4). On RX7 and 929, if "88" does not flash, check main relay and terminals 1N and 1P of PCMT for an open or short circuit.

3) If "88" flashes and buzzer sounds continuously for more than 20 seconds, check wiring to terminal 2N of PCMT for an open or short circuit. See WIRING DIAGRAMS for wire color identification. If wiring is okay, replace PCMT and repeat steps 1-2).

4) Note fault code numbers. See TROUBLE CODE IDENTIFICATION CHARTS. Perform appropriate code chart. See TROUBLE CODE CHARTS. After

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repairs are made, clear codes by disconnecting negative battery cable for 20 seconds.

5) Remove OEM tester and road test vehicle at 31 MPH. Depress accelerator fully, stop vehicle gradually. Reconnect OEM tester to test connector and connect grounds. Turn ignition on and check for trouble codes.

6) If transmission problems are still present, or no trouble codes are stored, see ELECTRICAL COMPONENTS TESTS under TESTING.

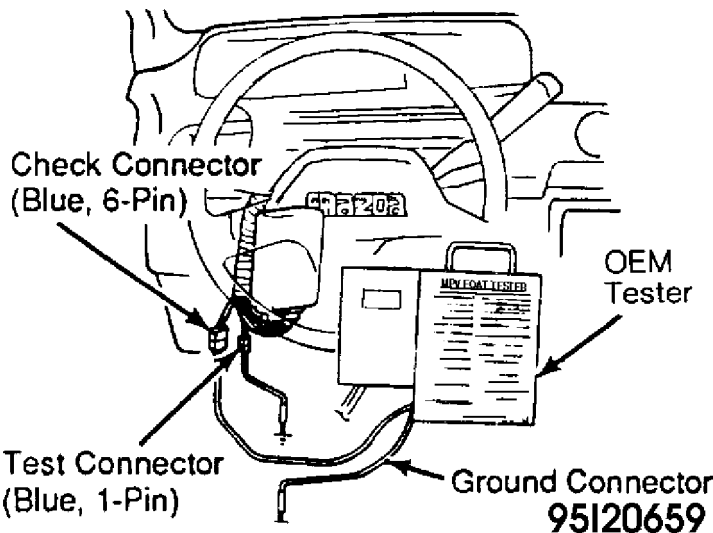
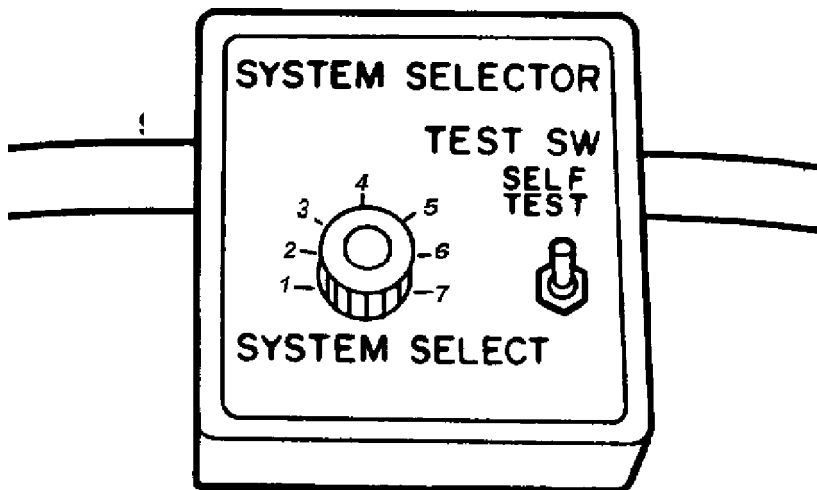


Fig. 14: Connecting OEM Tester
Courtesy of Mazda Motors Corp.



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Fig. 15: Identifying System Selector Switch Positions
Courtesy of Mazda Motors Corp.

TROUBLE CODE CHARTS

TROUBLE CODE IDENTIFICATION CHARTS

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL















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Code No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point
01		Engine rpm signal	No input signal from ECU	<ul style="list-style-type: none"> Wiring from powertrain control module (Engine) to powertrain control module (Transmission) Powertrain control module (Engine)
06		Vehicle speed sensor (Revolution sensor)	No input signal from vehicle speed sensor (Revolution sensor)	<ul style="list-style-type: none"> Vehicle speed sensor connector Wiring from vehicle speed sensor to powertrain control module (Transmission) Vehicle speedometer sensor resistance
07		Vehicle speedometer sensor	No input signal from vehicle speedometer sensor	<ul style="list-style-type: none"> Vehicle speedometer sensor connector Wiring from vehicle speedometer sensor to combination meter Wiring from combination meter to powertrain control module (Transmission) Speedometer resistance
12		Throttle position sensor	Open or short circuit of throttle position sensor or wiring	<ul style="list-style-type: none"> Throttle position sensor connector Wiring from throttle position sensor to powertrain control module (Transmission) Throttle position sensor resistance
55		Vehicle speed pulse generator	No input signal from vehicle speed pulse generator	<ul style="list-style-type: none"> Vehicle speed pulse generator connector Wiring from vehicle speed pulse generator to powertrain control module (Transmission) Vehicle speed pulse generator resistance
56		ATF thermosensor	Open or short circuit of ATF thermosensor or wiring	<ul style="list-style-type: none"> ATF thermosensor connector Wiring from ATF thermosensor to powertrain control module (Transmission) ATF thermosensor resistance
57		Reduce torque signal/Slip lock-up signal, torque reduced signal	Open or short circuit of reduce torque signal/slip lockup signal wiring, and/or torque reduced signal wiring	<ul style="list-style-type: none"> Wiring from powertrain control module (Engine) to powertrain control module (Transmission) Powertrain control module (Transmission) Powertrain control module (engine)
58		Barometric absolute pressure sensor	Open or short circuit of barometric absolute pressure sensor wiring	<ul style="list-style-type: none"> Wiring from powertrain control module (Engine) to powertrain control module (Transmission) Powertrain control module (engine)
60		Shift A solenoid valve	Open or short circuit of solenoid valve wiring	<ul style="list-style-type: none"> Solenoid valve connector Wiring from solenoid valve to powertrain control module (Transmission) Solenoid valve resistance Wiring from dropping resistor to powertrain control module (Transmission) (Only No.64) Dropping resistor resistance (Only No.64)
61		Shift B solenoid valve		
62		Overrunning clutch solenoid valve		
63		Lockup solenoid valve		
64		Line pressure solenoid valve		
65		Lockup control solenoid valve		

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Fig. 16: RX7 Trouble Code Identification Chart
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL





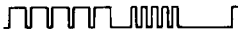




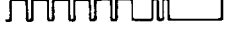

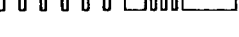

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CODE NO.	LOCATION OF MAL-FUNCTION	HOLD INDICATOR LIGHT FLASH CYCLE	SELF-DIAGNOSIS	FAIL-SAFE
01	Engine rpm signal (№1 signal)	 ON OFF	No input signal from distributor №1 signal	—
06	Vehicle speed sensor (revolution sensor)		No input signal from vehicle speed sensor	Shifting performed in accordance with signals from vehicle speedometer sensor
07	Vehicle speedometer sensor		No input signal from speedometer (vehicle speedometer sensor)	If a malfunction occurs to both vehicle speed sensor and vehicle speedometer sensor, shift A and B solenoid valve go OFF*. Lockup not provided
12	Throttle position sensor		Open or short circuit of throttle position sensor or wiring	Throttle opening judged as follows: 4/8 stroke: Idle switch OFF 0/8 stroke: Idle switch ON
55	Vehicle speed pulse generator		No input signal from vehicle speed pulse generator	Shifting performed in accordance with signals from vehicle speed sensor. Torque reduction control not provided
56	ATF thermosensor		Open or short circuit of ATF thermo sensor or wiring	—
57	Reduce torque signal, Torque reduced signal		Open or short circuit of reduce torque signal / torque reduced signal or wiring	Torque reduction control not provided
60	Shift A solenoid valve		Open or short circuit of solenoid valves or wiring	Shift A and B solenoid valves go OFF*
61	Shift B solenoid valve			
62	Overrunning clutch solenoid valve			Overrunning clutch solenoid valve goes OFF and engine braking is available when coasting. Shifting performed normally
63	Lockup solenoid valve			Lockup not provided. Shifting performed normally
64	Line pressure solenoid valve			Line pressure solenoid valve goes OFF and line pressure is set at maximum. Shifting performed normally
65	Lockup control solenoid valve			Lockup not provided. Shifting performed normally

* - If both shift "A" and "B" solenoid valves go OFF, "D" and "S" ranges become 3rd gear position and "L" range becomes 2nd gear position.

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Fig. 17: 929 Trouble Code Identification Chart
Courtesy of Mazda Motors Corp.

RX7 & 929 TROUBLE CODE CHARTS

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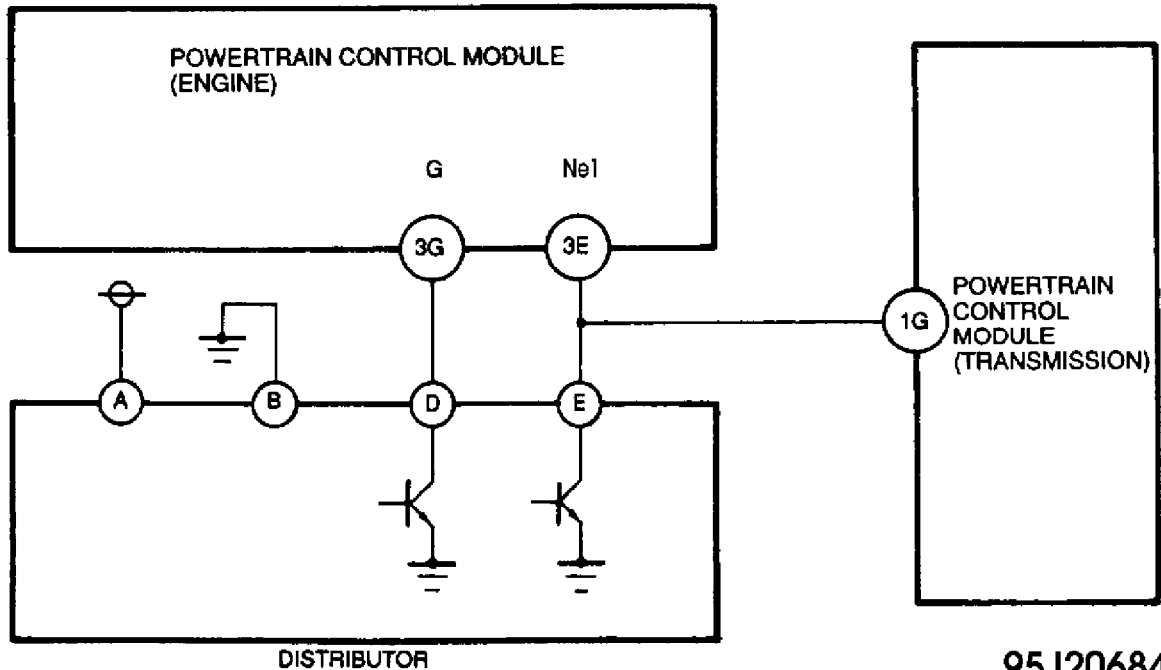


Fig. 18: Schematic - Service Code No. 1
Courtesy of Mazda Motors Corp.

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SERVICE CODE NO. 01 ENGINE RPM SIGNAL					
STEP	INSPECTION			ACTION	
1	Are there any poor connections at distributor, Powertrain Control Module (Engine) and Powertrain Control Module (Transmission) connectors?			Yes	Repair or replace connector
				No	Go to next step
2	Connect a circuit tester to terminals as shown. Is input voltage of engine rpm signal at Powertrain Control Module (Transmission) OK?			Yes	Go to step 6
				No	Check wiring and connectors from Powertrain Control Module (Transmission) to distributor If OK, go to next step If not OK, repair wiring and /or connector
		(+) term.	(-) term.	Voltage (V)	Condition
		1G	Ground	2—3	While driving
				0 or 4.5—5.5	Engine stopped
3	Disconnect the distributor connector. Is voltage at Powertrain Control Module (Engine) terminal OK?			Yes	Go to next step
				No	Replace Powertrain Control Module (Transmission)
		(+) term.	(-) term.	Voltage (V)	Condition
		3E	Ground	4.5—5.5	Ignition switch ON
4	At step 3 condition, is the voltage to the distributor connector (vehicle-side) OK?			Yes	Replace distributor
				No	Go to next step
		(+) term.	(-) term.	Voltage (V)	Condition
		G/W	Ground	4.5—5.5	Ignition switch ON
5	Is there continuity between distributor connector (vehicle-side) and Powertrain Control Module (Engine) terminal 3E?			Yes	Go to next step
				No	Repair wiring and/or connector
6	Disconnect negative battery cable for at least 20 seconds. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace Powertrain Control Module (Transmission)
				No	Intermittent poor connection Check for cause

Fig. 19: Flow Chart - Service Code No. 1
Courtesy of Mazda Motors Corp.

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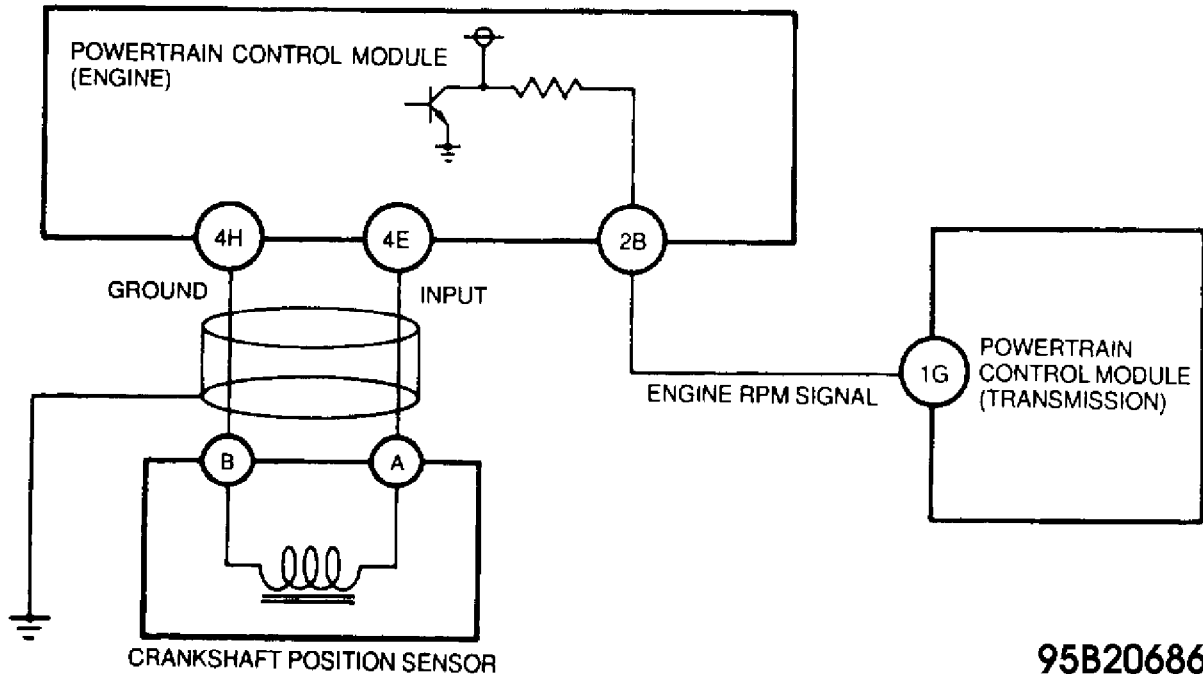


Fig. 20: Schematic - Diagnostic Trouble Code No. 1
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.01		ENGINE RPM SIGNAL													
STEP	INSPECTION	ACTION													
1	Are there any poor connections at distributor, powertrain control module (Engine) and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector												
		No	Go to next step												
2	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at powertrain control module (Transmission) OK?	Yes	Go to step 5												
		No	Go to next step												
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="3">1G</td><td rowspan="3">Ground</td><td>0</td><td>Engine stopped</td></tr><tr><td>0.3-0.8</td><td>Engine idling</td></tr><tr><td>1.8-2.2</td><td>Engine running at 3,000 rpm (no load)</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	1G	Ground	0	Engine stopped	0.3-0.8	Engine idling	1.8-2.2	Engine running at 3,000 rpm (no load)
		(+) term.	(-) term.	Voltage (V)	Condition										
		1G	Ground	0	Engine stopped										
0.3-0.8	Engine idling														
1.8-2.2	Engine running at 3,000 rpm (no load)														
3	Disconnect 16-pin powertrain control module (Transmission) connector Is there continuity between terminal 1G of powertrain control module (Transmission) and terminal 2B of powertrain control module (Engine)?	Yes	Go to next step												
		No	Repair wiring												
4	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at powertrain control module (Engine) OK?	Yes	Go to next step												
		No	Check crank angle sensor and/or wiring												
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="3">2B</td><td rowspan="3">Ground</td><td>0</td><td>Engine stopped</td></tr><tr><td>0.3-0.8</td><td>Engine idling</td></tr><tr><td>1.8-2.2</td><td>Engine running at 3,000 rpm (no load)</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	2B	Ground	0	Engine stopped	0.3-0.8	Engine idling	1.8-2.2	Engine running at 3,000 rpm (no load)
		(+) term.	(-) term.	Voltage (V)	Condition										
		2B	Ground	0	Engine stopped										
0.3-0.8	Engine idling														
1.8-2.2	Engine running at 3,000 rpm (no load)														
If OK, replace powertrain control module (Engine) If not OK, repair or replace malfunction parts and/or wiring															
5	Disconnect negative battery cable for at least 20 seconds, and depress the brake pedal. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)												
		No	Intermittent poor connection Check for cause												

Fig. 21: Flow Chart - Diagnostic Trouble Code No. 1
Courtesy of Mazda Motors Corp.

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RX7 & 929

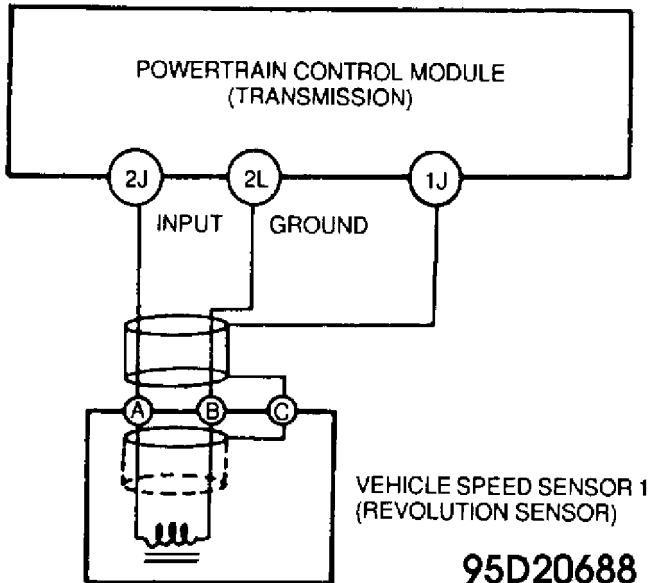


Fig. 22: Schematic - Diagnostic Trouble Code No. 6
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.06				VEHICLE SPEED SENSOR (REVOLUTION SENSOR)	
STEP	INSPECTION			ACTION	
1	Are there any poor connections at vehicle speed sensor and powertrain control module (Transmission) connectors?			Yes	Repair or replace connector
				No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speed sensor at powertrain control module (Transmission) OK?			Yes	Go to step 5
				No	Go to next step
	(+) term.	(-) term.	Voltage (V)		
	2J	2L	Approx. above 1.0 (AC range)	While driving (above 25km/h {16MPH})	
		Approx. 0 (AC range)	Vehicle stopped		
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2J and terminal 2L OK? Resistance: 500-1,000 Ω			Yes	Go to step 5
				No	Go to next step
4	Disconnect vehicle speed sensor connector Is resistance of sensor OK?			Yes	Check wiring and connectors from powertrain control module (Transmission) to vehicle speed sensor If OK, go to next step If not OK, repair wiring and/or connector
	Terminal		Resistance (Ω)		
	A \leftrightarrow B		500-1,000		
	B \leftrightarrow C		∞		
A \leftrightarrow C		∞			
5	Disconnect negative battery cable for at least 20 seconds, and depress the brake pedal Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace powertrain control module (Transmission)
				No	Intermittent poor connection Check for cause

95E20689

Fig. 23: Flow Chart - Diagnostic Trouble Code No. 6
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

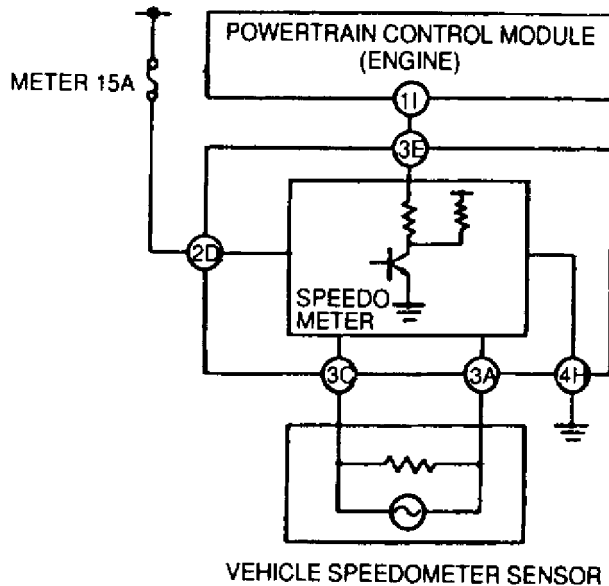
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95H20690

Fig. 24: Schematic - Diagnostic Trouble Code No. 7
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.07		VEHICLE SPEEDOMETER SENSOR													
STEP	INSPECTION	ACTION													
1	Are there any poor connections at vehicle speedometer sensor and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector												
		No	Go to next step												
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speedometer sensor at powertrain control module (Transmission) OK?	Yes	Go to step 8												
		No	Go to next step												
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td>11</td><td>Ground</td><td>2-3</td><td>Vehicle moving</td></tr><tr><td></td><td></td><td>0 or 4.5-5.5</td><td>Vehicle stopped</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	11	Ground	2-3	Vehicle moving			0 or 4.5-5.5	Vehicle stopped
		(+) term.	(-) term.	Voltage (V)	Condition										
11	Ground	2-3	Vehicle moving												
		0 or 4.5-5.5	Vehicle stopped												
3	Remove combination meter Is there continuity between terminal 3E of meter connector and terminal 11 of powertrain control module (Transmission)?	Yes	Go to next step												
		No	Repair or replace wiring and/or connector												
4	Connect circuit tester to terminals 3C and 3A of meter connector Does pointer of circuit tester move slightly when rear wheels are slowly turned?	Yes	Go to next step												
		No	Replace speedometer												
5	Remove vehicle speedometer sensor Is resistance felt when turning speedometer driven gear by hand?	Yes	Go to next step												
		No	Replace vehicle speedometer sensor												
6	Disconnect vehicle speedometer sensor connector and connect circuit tester Does pointer of circuit tester move slightly when driven gear is slowly turned?	Yes	Go to next step												
		No	Replace vehicle speedometer sensor												
7	Disconnect vehicle speedometer sensor connector Is continuity of sensor OK? Resistance: Approx. 290 Ω (20°C (68°F)); reference	Yes	Check wiring and connectors from vehicle speedometer sensor to speedometer If OK, go to next step If not OK, repair wiring and/or connector												
		No	Replace vehicle speedometer sensor												
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)												
		No	Intermittent poor connection Check for cause												

95I20691

Fig. 25: Flow Chart - Diagnostic Trouble Code No. 7
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

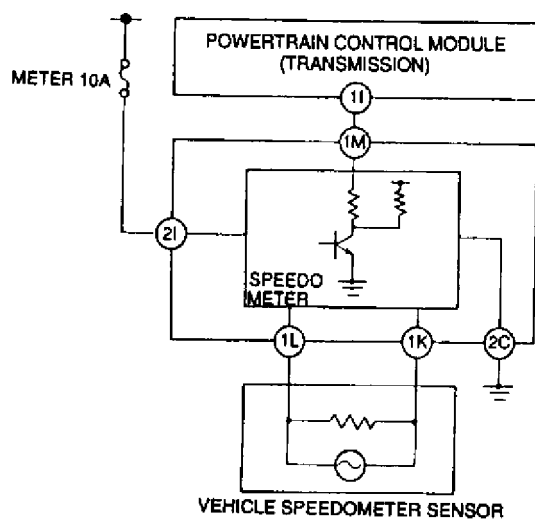
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95J20692

Fig. 26: Schematic - Service Code No. 7
Courtesy of Mazda Motors Corp.

SERVICE CODE NO. 07 VEHICLE SPEEDOMETER SENSOR															
STEP	INSPECTION	ACTION													
1	Are there any poor connections at vehicle speed sensor and Powertrain Control Module (Transmission) connectors?	Yes	Repair or replace connector												
		No	Go to next step												
2	Connect a circuit tester to terminals as shown. Is input voltage of vehicle speedometer sensor at Powertrain Control Module (Transmission) OK?	Yes	Go to step 7												
		No	Go to next step												
	<table border="1"> <thead> <tr> <th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr> </thead> <tbody> <tr> <td>1I</td><td>Ground</td><td>2—3</td><td>While driving</td></tr> <tr> <td></td><td></td><td>0 or 4.5—5.5</td><td>Vehicle stopped</td></tr> </tbody> </table>	(+) term.	(-) term.	Voltage (V)	Condition	1I	Ground	2—3	While driving			0 or 4.5—5.5	Vehicle stopped		
(+) term.	(-) term.	Voltage (V)	Condition												
1I	Ground	2—3	While driving												
		0 or 4.5—5.5	Vehicle stopped												
3	Remove combination meter. Is there continuity between terminal 1M of meter connector and terminal 1I of Powertrain Control Module (Transmission)?	Yes	Go to next step												
		No	Repair or replace wiring and/or connector												
4	Connect circuit tester to terminals 1K and 1L of meter connector. Does pointer of circuit tester move slightly when rear wheels are slowly turned?	Yes	Replace speedometer												
		No	Go to next step												
5	Remove vehicle speedometer sensor. Is resistance felt when turning speedometer-driven gear by hand?	Yes	Go to next step												
		No	Replace vehicle speedometer sensor												
6	Disconnect vehicle speedometer sensor connector and connect circuit tester. Does pointer of circuit tester move slightly when driven gear is slowly turned?	Yes	Go to next step												
		No	Replace vehicle speedometer sensor												
7	Disconnect vehicle speedometer sensor connector. Is continuity of sensor OK?	Yes	Check wiring and connectors from vehicle speedometer sensor to speedometer. If OK, go to next step. If not OK, repair wiring and/or connector.												
	Resistance: Approx. 290Ω (20°C (68°F)); reference	No	Replace vehicle speedometer sensor												
8	Disconnect negative battery cable for at least 20 seconds. Connect battery cable and recheck for diagnostic trouble code. Is diagnostic trouble code displayed?	Yes	Replace Powertrain Control Module (Transmission)												
		No	Intermittent poor connection. Check for cause.												

95A20693

Fig. 27: Flow Chart - Service Code No. 7
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

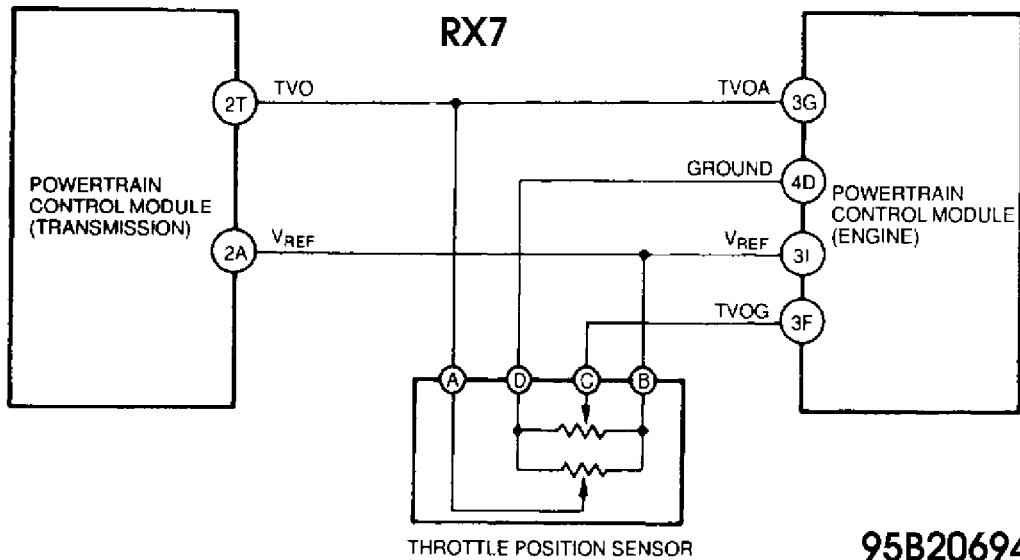
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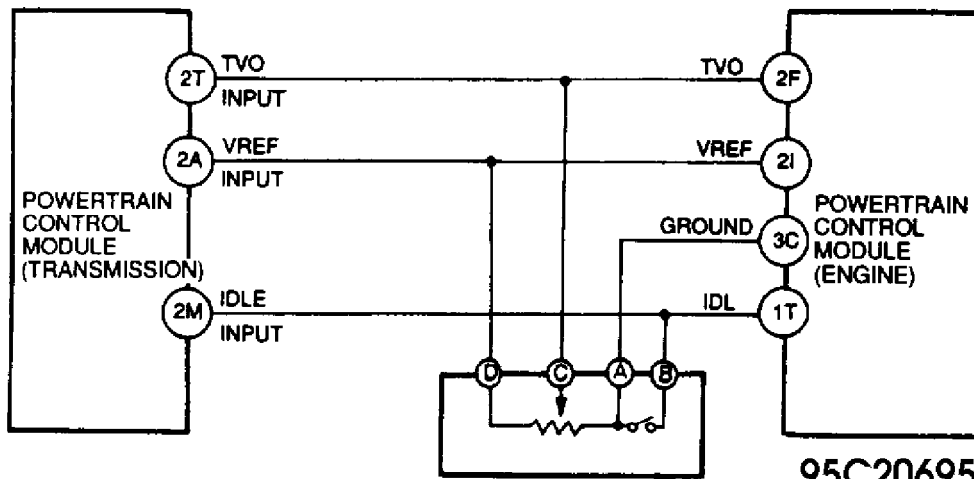
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95B20694

Fig. 28: Schematic - Diagnostic Trouble Code No. 12 (1 of 2)
Courtesy of Mazda Motors Corp.



95C20695

Fig. 29: Schematic - Diagnostic Trouble Code No. 12 (2 of 2)
Courtesy of Mazda Motors Corp.

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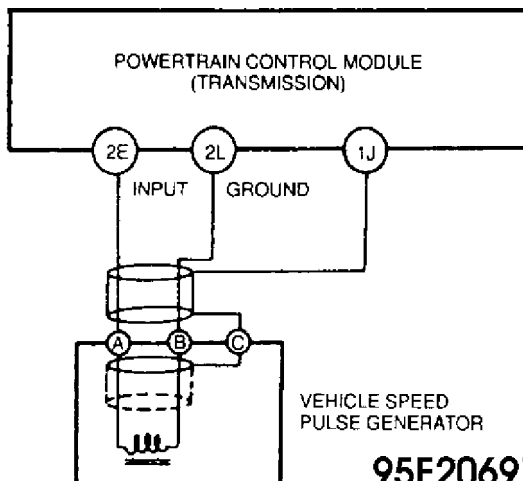
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DIAGNOSTIC TROUBLE CODE NO.12		THROTTLE POSITION SENSOR											
STEP	INSPECTION		ACTION										
1	Are there any poor connections at throttle position sensor and powertrain control module (Transmission) connector or terminal?		Yes	Repair or replace connector									
			No	Go to next step									
2	Connect a circuit tester to terminals as shown Is input voltage of throttle position sensor (TVO) at powertrain control module (Transmission) OK?		Yes	Go to step 5									
			No	Go to next step									
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">Ground</td><td>0.1-1.1</td><td>Throttle valve closed throttle position</td></tr><tr><td>4.0-4.5</td><td>Throttle valve wide open throttle</td></tr></table>	(+) term.	(-) term.	Voltage (V)	Condition	2T	Ground	0.1-1.1	Throttle valve closed throttle position	4.0-4.5	Throttle valve wide open throttle	
(+) term.	(-) term.	Voltage (V)	Condition										
2T	Ground	0.1-1.1	Throttle valve closed throttle position										
		4.0-4.5	Throttle valve wide open throttle										
3	Connect a circuit tester to terminals as shown Is input voltage of throttle position sensor (VREP) at powertrain control module (Transmission) OK?		Yes	Go to next step									
			No	Check voltage at terminal 3I of powertrain control module (Engine) Voltage: 4.5-5.5V (Ignition switch ON) If OK, go to next step If not OK, repair wiring and/or connector, or replace powertrain control module (Transmission)									
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">2A</td><td rowspan="2">Ground</td><td>4.5-5.5</td><td>Ignition switch ON</td></tr><tr><td>0</td><td>Ignition switch OFF</td></tr></table>	(+) term.	(-) term.	Voltage (V)	Condition	2A	Ground	4.5-5.5	Ignition switch ON	0	Ignition switch OFF	
(+) term.	(-) term.	Voltage (V)	Condition										
2A	Ground	4.5-5.5	Ignition switch ON										
		0	Ignition switch OFF										
4	Is throttle position sensor OK?		Yes	Check wiring and connectors from powertrain control module (Transmission) to throttle position sensor If OK, go to next step If not OK, repair wiring and/or connector									
			No	Adjust or replace throttle position sensor									
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?		Yes	Replace powertrain control module (Transmission)									
			No	Intermittent poor connection Check for cause									

95D20696

Fig. 30: Flow Chart - Diagnostic Trouble Code No. 12
Courtesy of Mazda Motors Corp.



95E20697

Fig. 31: Schematic - Diagnostic Trouble Code No. 55
Courtesy of Mazda Motors Corp.

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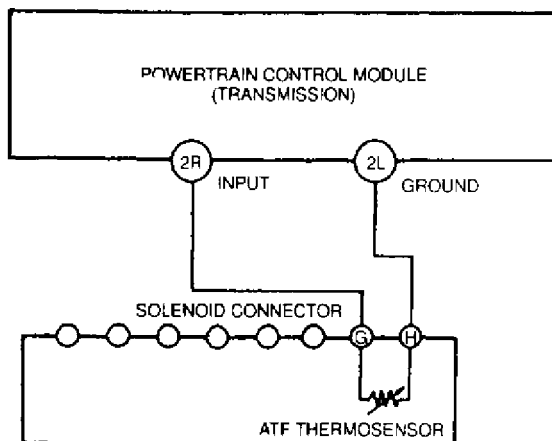
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DIAGNOSTIC TROUBLE CODE NO.55		VEHICLE SPEED PULSE GENERATOR									
STEP	INSPECTION	ACTION									
1	Are there any poor connections at vehicle speed pulse generator and powertrain control module (Transmission) connector or terminal?	Yes	Repair or replace connector								
		No	Go to next step								
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speed pulse generator at powertrain control module (Transmission) OK?	Yes	Go to step 5								
		No	Go to next step								
		<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">2E</td><td rowspan="2">2L</td><td>Approx. 0 above 0.5 (AC range)</td><td>While driving (above 25km/h (16mph))</td></tr><tr><td>Approx. 0 (AC range)</td><td>Vehicle stopped</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	2E	2L	Approx. 0 above 0.5 (AC range)	While driving (above 25km/h (16mph))
(+) term.	(-) term.	Voltage (V)	Condition								
2E	2L	Approx. 0 above 0.5 (AC range)	While driving (above 25km/h (16mph))								
		Approx. 0 (AC range)	Vehicle stopped								
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2E and terminal 2L OK? Resistance: 2.2-3.5 kΩ	Yes	Go to next step								
		No	Go to next step								
4	Disconnect vehicle speed pulse generator connector Is resistance of vehicle speed pulse generator OK?	Yes	Check wiring and connectors from powertrain control module (Transmission) to vehicle speed pulse generator If OK, go to next step If not OK, repair wiring and/or connector								
		No	Replace vehicle speed pulse generator								
		<table><tr><th>Terminal</th><th>Resistance (KΩ)</th></tr><tr><td>A ↔ B</td><td>2.2-3.5</td></tr><tr><td>B ↔ C</td><td>∞</td></tr><tr><td>A ↔ C</td><td>∞</td></tr></table>		Terminal	Resistance (KΩ)	A ↔ B	2.2-3.5	B ↔ C	∞	A ↔ C	∞
Terminal	Resistance (KΩ)										
A ↔ B	2.2-3.5										
B ↔ C	∞										
A ↔ C	∞										
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)								
		No	Intermittent poor connection Check for cause								

95F20698

Fig. 32: Flow Chart - Diagnostic Trouble Code No. 55

Courtesy of Mazda Motors Corp.



95G20699

Fig. 33: Schematic - Diagnostic Code No. 56

Courtesy of Mazda Motors Corp.

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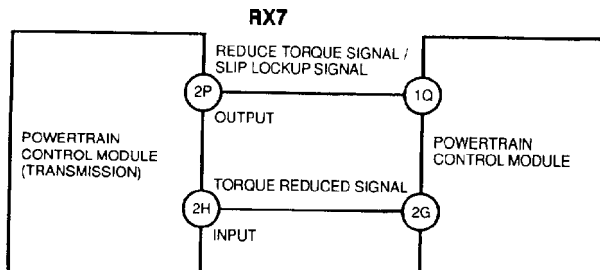
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RX7 & 929

DIAGNOSTIC TROUBLE CODE NO.56		ATF THERMOSENSOR													
STEP	INSPECTION	ACTION													
1	Are there any poor connections at ATP thermosensor and powertrain control module (Transmission) connector or terminal?	Yes	Repair or replace connector												
		No	Go to next step												
2	Connect a circuit tester to terminals as shown Is input voltage of ATF thermosensor at powertrain control module (Transmission) OK?	Yes	Go to step 5												
		No	Go to next step												
<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="3">2R</td><td rowspan="3">2L</td><td>Approx. 1.8</td><td>ATF temp. 10°C (50°F)</td></tr><tr><td>Approx. 1.1</td><td>ATF temp. 40°C (104°F)</td></tr><tr><td>Approx. 0.4</td><td>ATF temp. 80°C (176°F)</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	2R	2L	Approx. 1.8	ATF temp. 10°C (50°F)	Approx. 1.1	ATF temp. 40°C (104°F)	Approx. 0.4	ATF temp. 80°C (176°F)		
(+) term.	(-) term.	Voltage (V)	Condition												
2R	2L	Approx. 1.8	ATF temp. 10°C (50°F)												
		Approx. 1.1	ATF temp. 40°C (104°F)												
		Approx. 0.4	ATF temp. 80°C (176°F)												
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2R and terminal 2L OK?	Yes	Go to step 5												
		No	Go to next step												
<table><tr><th>Terminal</th><th>Resistance (KΩ)</th></tr><tr><td rowspan="3">2R ↔ 2L</td><td>Approx. 3.8 ATF temp. 10°C (50°F)</td></tr><tr><td>Approx. 1.2 ATF temp. 40°C (104°F)</td></tr><tr><td>Approx. 0.3 ATF temp. 80°C (176°F)</td></tr></table>		Terminal	Resistance (KΩ)	2R ↔ 2L	Approx. 3.8 ATF temp. 10°C (50°F)	Approx. 1.2 ATF temp. 40°C (104°F)	Approx. 0.3 ATF temp. 80°C (176°F)								
Terminal	Resistance (KΩ)														
2R ↔ 2L	Approx. 3.8 ATF temp. 10°C (50°F)														
	Approx. 1.2 ATF temp. 40°C (104°F)														
	Approx. 0.3 ATF temp. 80°C (176°F)														
4	Disconnect solenoid connector Is resistance between terminal G and terminal H of ATF thermosensor OK?	Yes	Check wiring and connectors from powertrain control module (Transmission) to ATF thermosensor If OK, go to next step If not OK, repair wiring and/or connector												
		No	Replace ATF thermosensor												
<table><tr><th>Terminal</th><th>Resistance (KΩ)</th></tr><tr><td rowspan="3">G ↔ H</td><td>Approx. 3.8 ATF temp. 10°C (50°F)</td></tr><tr><td>Approx. 1.2 ATF temp. 40°C (104°F)</td></tr><tr><td>Approx. 0.3 ATF temp. 80°C (176°F)</td></tr></table>		Terminal	Resistance (KΩ)	G ↔ H	Approx. 3.8 ATF temp. 10°C (50°F)	Approx. 1.2 ATF temp. 40°C (104°F)	Approx. 0.3 ATF temp. 80°C (176°F)								
Terminal	Resistance (KΩ)														
G ↔ H	Approx. 3.8 ATF temp. 10°C (50°F)														
	Approx. 1.2 ATF temp. 40°C (104°F)														
	Approx. 0.3 ATF temp. 80°C (176°F)														
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)												
		No	Intermittent poor connection Check for cause												

95J20700

Fig. 34: Flow Chart - Diagnostic Code No. 56
Courtesy of Mazda Motors Corp.



95A20701

Fig. 35: Schematic - Diagnostic Code No. 57
Courtesy of Mazda Motors Corp.

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DIAGNOSTIC TROUBLE CODE NO.57				REDUCE TORQUE SIGNAL / SLIP LOCKUP SIGNAL, TORQUE REDUCED SIGNAL	
STEP	INSPECTION			ACTION	
1	Are there any poor connections at powertrain control module (Engine) and powertrain control module (Transmission) connectors?			Yes	Repair or replace connector
				No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at powertrain control module (Transmission) OK? B+: Battery positive voltage			Yes	Go to step 4
				No	Go to next step
		(+) term.	(-) term.	Voltage (V)	Condition
				B+	Engine idling
		2H	Ground	Below 1.0	Throttle opening above 1/8 (Engine coolant temp below 40°C {104°F})
3	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2H of powertrain control module (Transmission) and terminal 2G of powertrain control module (Engine)?			Yes	Go to next step
				No	Repair wiring
4	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at powertrain control module (Transmission) OK? B+: Battery positive voltage			Yes	Go to step 6
				No	Go to next step
		(+) term.	(-) term.	Voltage (V)	Condition
				Below 1.0	When shifting from 1st to 2nd or from 2nd to 3GR with the throttle opening above 1.5/8
		2P	Ground		When slip lockup with the throttle opening below 0.5/8
				B+	Engine idling
5	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2P of powertrain control module (Transmission) and terminal 1Q of powertrain control module (Engine)?			Yes	Go to next step
				No	Repair wiring
6	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace powertrain control module (Transmission) or powertrain control module (Engine)
				No	Intermittent poor connection Check for cause

95B20702

Fig. 36: Flow Chart - Diagnostic Code No. 57

Courtesy of Mazda Motors Corp.

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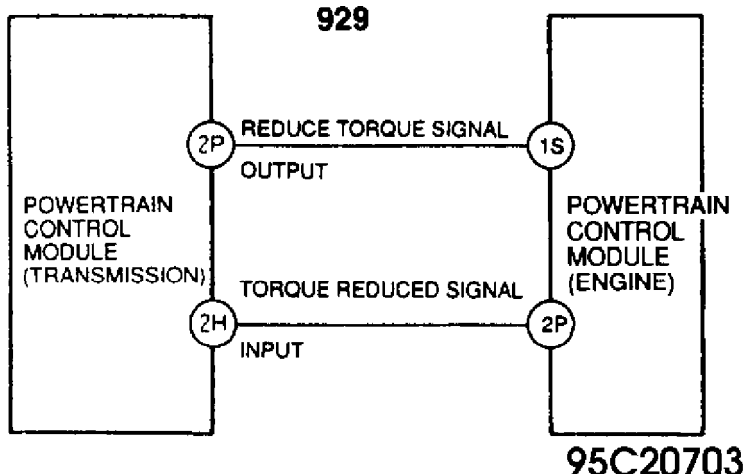


Fig. 37: Schematic - Service Code No. 57
Courtesy of Mazda Motors Corp.

SERVICE CODE NO. 57 REDUCE TORQUE SIGNAL, TORQUE REDUCED SIGNAL														
STEP	INSPECTION		ACTION											
1	Are there any poor connections at Powertrain Control Module (Engine) and Powertrain Control Module (Transmission) connectors?		Yes	Repair or replace connector										
			No	Go to next step										
2	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at Powertrain Control Module (Transmission) OK?		Yes	Go to step 4										
			No	Go to next step										
B+: Battery positive voltage														
<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">2H</td><td rowspan="2">Ground</td><td>B+</td><td>Engine warm</td></tr><tr><td>Below 1</td><td>Engine cool</td></tr></table>					(+) term.	(-) term.	Voltage (V)	Condition	2H	Ground	B+	Engine warm	Below 1	Engine cool
(+) term.	(-) term.	Voltage (V)	Condition											
2H	Ground	B+	Engine warm											
		Below 1	Engine cool											
Some kinds of testers may give incorrect values. This is because the voltage output period is very short.														
3	Disconnect 20-pin Powertrain Control Module (Transmission) connector Is there continuity between terminal 2H of Powertrain Control Module (Transmission) and terminal 2P of Powertrain Control Module (Engine)?		Yes	Go to next step										
			No	Repair wiring										
4	Connect a circuit tester to terminals as shown Is output voltage of reduce torque signal at Powertrain Control Module (Transmission) OK?		Yes	Go to step 6										
			No	Go to next step										
B+: Battery positive voltage														
<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">2P</td><td rowspan="2">Ground</td><td>Below 1</td><td>Shifting</td></tr><tr><td>B+</td><td>Others</td></tr></table>					(+) term.	(-) term.	Voltage (V)	Condition	2P	Ground	Below 1	Shifting	B+	Others
(+) term.	(-) term.	Voltage (V)	Condition											
2P	Ground	Below 1	Shifting											
		B+	Others											
Some kinds of testers may give incorrect values. This is because the voltage output period is very short.														
5	Disconnect 20-pin Powertrain Control Module (Transmission) connector Is there continuity between terminal 2P of Powertrain Control Module (Transmission) and terminal 1S of Powertrain Control Module (Engine)?		Yes	Go to next step										
			No	Repair wiring										
6	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?		Yes	Replace Powertrain Control Module (Transmission) or Powertrain Control Module (Engine)										
			No	Intermittent poor connection Check for cause										

95D20704

Fig. 38: Flow Chart - Service Code No. 57
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

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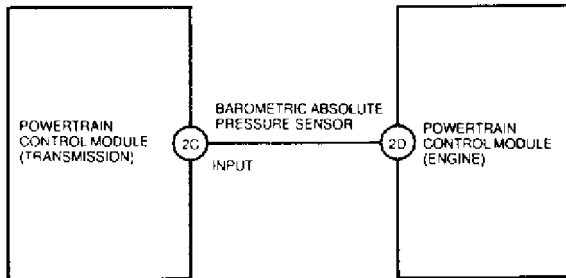
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RX7 & 929



95E20705

Fig. 39: Schematic - Diagnostic Code No. 58
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.58		BAROMETRIC ABSOLUTE PRESSURE SENSOR											
STEP	INSPECTION		ACTION										
1	Are there any poor connections at powertrain control module (Engine) and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector										
		No	Go to next step										
2	Connect a circuit tester to terminals as shown Is input voltage of barometric absolute pressure sensor at powertrain control module (Transmission) OK?	Yes	Go to step 5										
		No	Go to next step										
		<table border="1"> <thead> <tr> <th>(+)term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr> </thead> <tbody> <tr> <td>2C</td><td>Ground</td><td>2.0-4.5</td><td>Ignition switch ON</td></tr> <tr> <td></td><td></td><td>0V</td><td>Ignition switch OFF</td></tr> </tbody> </table>	(+)term.	(-) term.	Voltage (V)	Condition	2C	Ground	2.0-4.5	Ignition switch ON			0V
(+)term.	(-) term.	Voltage (V)	Condition										
2C	Ground	2.0-4.5	Ignition switch ON										
		0V	Ignition switch OFF										
3	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2C of powertrain control module (Transmission) and terminal 2D of powertrain control module (Engine)?	Yes	Go to next step										
		No	Repair wiring										
4	Connect a circuit tester to terminals as shown Is output voltage of barometric absolute pressure sensor at powertrain control module (Engine) OK?	Yes	Go to next step										
		No	Replace powertrain control module (Engine)										
		<table border="1"> <thead> <tr> <th>(+)term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr> </thead> <tbody> <tr> <td>2D</td><td>Ground</td><td>2.0-4.5V</td><td>Ignition switch ON</td></tr> <tr> <td></td><td></td><td>0V</td><td>Ignition switch OFF</td></tr> </tbody> </table>	(+)term.	(-) term.	Voltage (V)	Condition	2D	Ground	2.0-4.5V	Ignition switch ON			0V
(+)term.	(-) term.	Voltage (V)	Condition										
2D	Ground	2.0-4.5V	Ignition switch ON										
		0V	Ignition switch OFF										
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)										
		No	Intermittent poor connection Check for cause										

95F20706

Fig. 40: Flow Chart - Diagnostic Code No. 58
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 32)

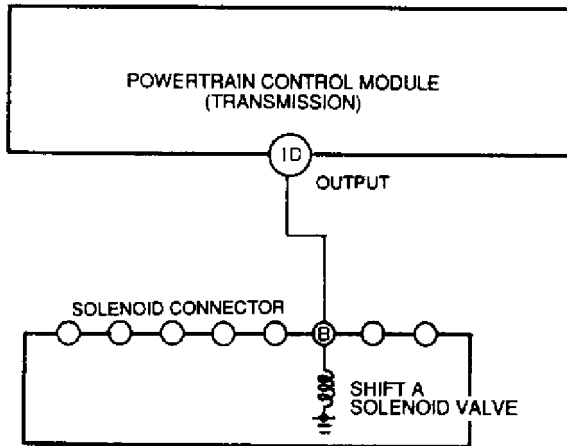
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RX7 & 929



95G20707

Fig. 41: Schematic - Service Code No. 60
Courtesy of Mazda Motors Corp.

SERVICE CODE NO. 60 SHIFT A SOLENOID VALVE															
STEP	INSPECTION			ACTION											
1	Are there any poor connections at solenoid valve and Powertrain Control Module (Transmission) connectors?			Yes	Repair or replace connector										
				No	Go to next step										
2	Connect a circuit tester to terminals as shown Is output voltage of shift A solenoid valve at Powertrain Control Module (Transmission) OK? B+: Battery positive voltage <table border="1"> <tr> <th>(+) term.</th> <th>(-) term.</th> <th>Voltage (V)</th> <th>Condition</th> </tr> <tr> <td rowspan="2">1D</td> <td rowspan="2">Ground</td> <td>B+</td> <td>1st, Fourth gear</td> </tr> <tr> <td>Below 1</td> <td>2nd, Third gear</td> </tr> </table>			(+) term.	(-) term.	Voltage (V)	Condition	1D	Ground	B+	1st, Fourth gear	Below 1	2nd, Third gear	Yes	Check wiring and go to step 5
				(+) term.	(-) term.	Voltage (V)	Condition								
				1D	Ground	B+	1st, Fourth gear								
						Below 1	2nd, Third gear								
No	Go to next step														
3	Disconnect 16-pin Powertrain Control Module (Transmission) connector Is resistance between terminal 1D and a ground Resistance: 20—40 Ω			Yes	Go to step 5										
				No	Go to next step										
4	Disconnect solenoid connector Is resistance between ground and terminal B of shift A solenoid valve OK? Resistance: 20—40 Ω			Yes	Check wiring and connectors from Powertrain Control Module (Transmission) to shift A solenoid valve If OK, go to next step If not OK, repair wiring and/or connector										
				No	Replace shift A solenoid valve										
5	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace Powertrain Control Module (Transmission)										
				No	Intermittent poor connection Check for cause										

95H20708

Fig. 42: Flow Chart - Service Code No. 60
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 33)

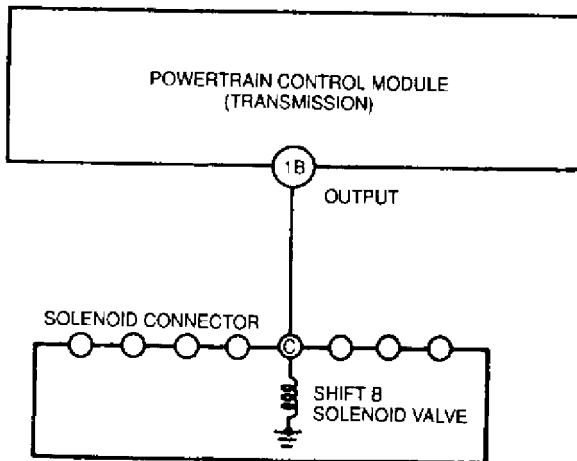
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95120709

Fig. 43: Schematic - Diagnostic Code No. 61
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.61				SHIFT B SOLENOID VALVE							
STEP	INSPECTION			ACTION							
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?			Yes	Repair or replace connector						
				No	Go to next step						
2	Connect a circuit tester to terminals as shown Is output voltage of shift B solenoid valve at powertrain control module (Transmission) OK? B+: Battery positive voltage			Yes	Check wiring and go to step 5						
				No	Go to next step						
				<table><tr><th>(+) term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr><tr><td rowspan="2">1B</td><td rowspan="2">Ground</td><td>B+</td><td>1st, 2nd gear</td></tr><tr><td>Below 1.0</td><td>3GR, 4GR gear</td></tr></table>		(+) term.	(-) term.	Voltage (V)	Condition	1B	Ground
(+) term.	(-) term.	Voltage (V)	Condition								
1B	Ground	B+	1st, 2nd gear								
		Below 1.0	3GR, 4GR gear								
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1B and a ground OK? Resistance: 20-40Ω			Yes	Go to step 5						
				No	Go to next step						
4	Disconnect solenoid connector Is resistance between ground and terminal C of shift B solenoid valve OK? Resistance: 20-40Ω			Yes	Check wiring and connectors from powertrain control module (Transmission) to shift B solenoid valve If OK, go to next step If not OK, repair wiring and/or connector						
				No	Replace shift B solenoid valve						
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace powertrain control module (Transmission)						
				No	Intermittent poor connection Check for cause						

95B20710

Fig. 44: Flow Chart - Diagnostic Code No. 61
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 34)

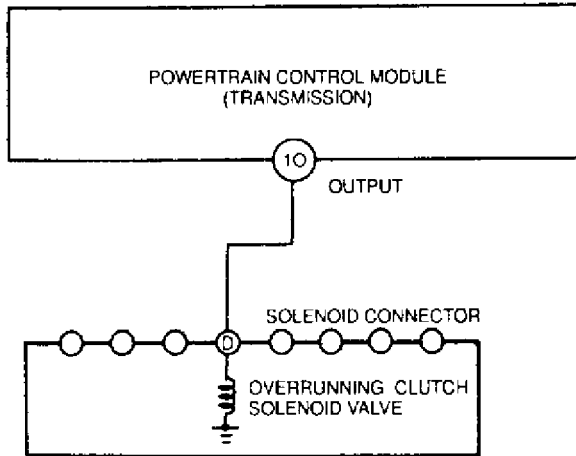
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RX7 & 929



95C20711

Fig. 45: Schematic - Diagnostic Code No. 62
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.62 OVERRUNNING CLUTCH SOLENOID VALVE														
STEP	INSPECTION		ACTION											
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?		Yes	Repair or replace connector										
			No	Go to next step										
2	Connect a circuit tester to terminals as shown Is output voltage of overrunning clutch solenoid valve at powertrain control module (Transmission) OK? B+: Battery positive voltage <table border="1"><thead><tr><th>(+)term.</th><th>(-) term.</th><th>Voltage (V)</th><th>Condition</th></tr></thead><tbody><tr><td rowspan="2">10</td><td rowspan="2">Ground</td><td>B+</td><td>D range (throttle valve closed)</td></tr><tr><td>Below 1.0</td><td>D range (throttle valve wide open throttle)</td></tr></tbody></table>		(+)term.	(-) term.	Voltage (V)	Condition	10	Ground	B+	D range (throttle valve closed)	Below 1.0	D range (throttle valve wide open throttle)	Yes	Check wiring and go to step 5
			(+)term.	(-) term.	Voltage (V)	Condition								
10	Ground	B+	D range (throttle valve closed)											
		Below 1.0	D range (throttle valve wide open throttle)											
			No	Go to next step										
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 10 and a ground OK? Resistance: 20-40Ω		Yes	Go to step 5										
			No	Go to next step										
4	Disconnect solenoid connector Is resistance between ground and terminal D of overrunning clutch solenoid valve OK? Resistance: 20-40Ω		Yes	Check wiring and connectors from powertrain control module (Transmission) to overrunning clutch solenoid valve If OK, go to next step If not OK, repair wiring and/or connector										
			No	Replace overrunning clutch solenoid valve										
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?		Yes	Replace powertrain control module (Transmission)										
			No	Intermittent poor connection Check for cause										

95D20712

Fig. 46: Flow Chart - Diagnostic Code No. 62
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 35)

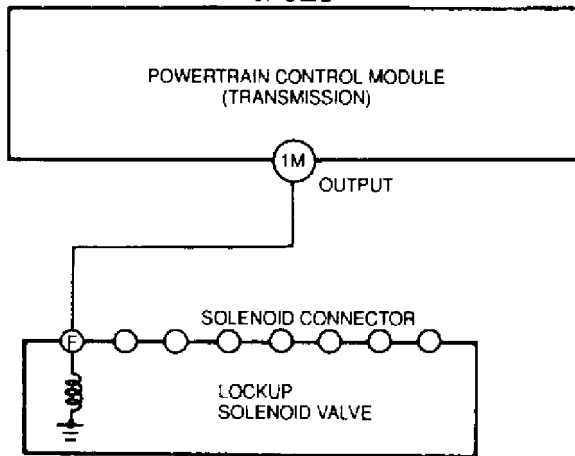
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95E20713

Fig. 47: Schematic - Diagnostic Code No. 63
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.63					LOCKUP SOLENOID VALVE					
STEP	INSPECTION			ACTION						
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?			Yes	Repair or replace connector					
				No	Go to next step					
2	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1M and a ground OK? Resistance: 10-20Ω			Yes	Go to step 4					
				No	Go to next step					
3	Disconnect solenoid connector Is resistance between ground and terminal F of lockup solenoid valve OK? Resistance: 10-20Ω			Yes	Check wiring and connectors from powertrain control module (Transmission) to lockup solenoid valve If OK, go to next step If not OK, repair wiring and/or connector					
				No	Replace lockup solenoid valve					
4	Connect a dwell meter to terminals as shown Is output duty of lockup solenoid valve at powertrain control module (Transmission) OK?			Yes	Go to next step					
				No	Replace powertrain control module (Transmission)					
						<table><tr><td>(+)term.</td><td>(-) term.</td><td>Duty (ON %)</td><td>Condition</td></tr><tr><td rowspan="2">1M</td><td rowspan="2">Ground</td><td>Approx. 5</td><td>No lockup</td></tr><tr><td>Approx. 100</td><td>Lockup</td></tr></table>	(+)term.	(-) term.	Duty (ON %)	Condition
(+)term.	(-) term.	Duty (ON %)	Condition							
1M	Ground	Approx. 5	No lockup							
		Approx. 100	Lockup							
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace powertrain control module (Transmission)					
				No	Intermittent poor connection Check for cause					

95F20714

Fig. 48: Flow Chart - Diagnostic Code No. 63
Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 36)

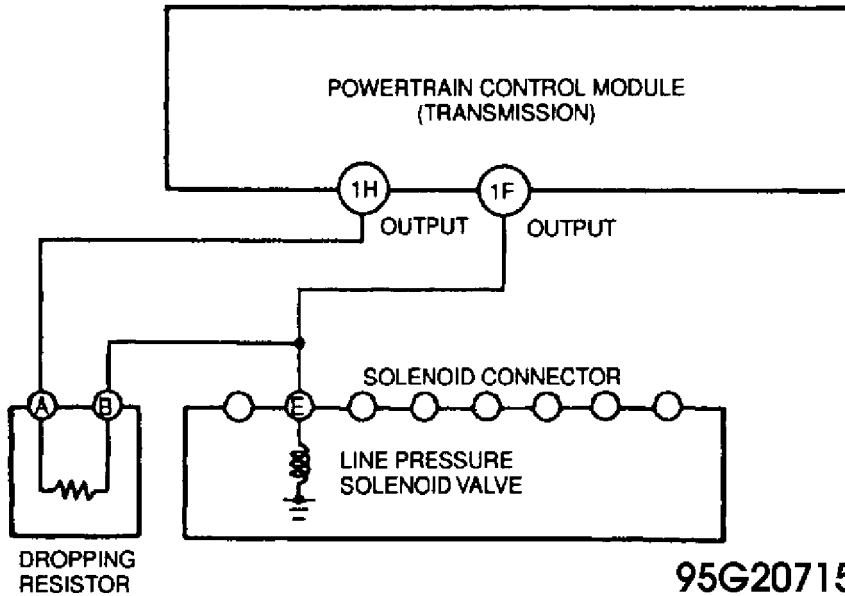
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RX7 & 929



95G20715

Fig. 49: Schematic - Diagnostic Code No. 64

Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.64 LINE PRESSURE SOLENOID VALVE															
STEP	INSPECTION	ACTION													
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector												
		No	Go to next step												
2	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1F (line pressure solenoid valve) and a ground OK? Resistance: 2.5-5.0Ω	Yes	Go to next step												
		No	Go to step 4												
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1H (dropping resistor) and a ground OK? Resistance: 12.5-19.0Ω	Yes	Go to step 5												
		No	Go to step 7												
4	Disconnect solenoid connector Is resistance between ground and terminal E of line pressure solenoid valve OK? Resistance: 2.5-5.0Ω	Yes	Check wiring and connectors from powertrain control module (Transmission) to line pressure solenoid valve If OK, go to next step If not OK, repair wiring and/or connector												
		No	Replace line pressure solenoid valve												
5	Connect a dwell meter to terminals as shown Is output duty of dropping resistor at powertrain control module (Transmission) OK?	Yes	Go to next step												
		No	Replace powertrain control module (Transmission), perform road test, and go to step 8												
	<table border="1"> <thead> <tr> <th>(+) term.</th><th>(-) term.</th><th>Duty (ON %)</th><th>Condition</th></tr> </thead> <tbody> <tr> <td>1H</td><td>Ground</td><td>Approx. 100</td><td>Throttle valve closed throttle</td></tr> <tr> <td></td><td></td><td>Approx. 5</td><td>Throttle valve wide open throttle</td></tr> </tbody> </table>	(+) term.	(-) term.	Duty (ON %)	Condition	1H	Ground	Approx. 100	Throttle valve closed throttle			Approx. 5	Throttle valve wide open throttle		
(+) term.	(-) term.	Duty (ON %)	Condition												
1H	Ground	Approx. 100	Throttle valve closed throttle												
		Approx. 5	Throttle valve wide open throttle												
6	Connect a dwell meter to terminals as shown Is output duty of line pressure solenoid valve at powertrain control module (Transmission) OK?	Yes	Go to next step												
		No	Replace powertrain control module (Transmission), perform road test, and go to step 8												
	<table border="1"> <thead> <tr> <th>(+) term.</th><th>(-) term.</th><th>Duty (ON %)</th><th>Condition</th></tr> </thead> <tbody> <tr> <td>1F</td><td>Ground</td><td>Approx. 100</td><td>Throttle valve closed throttle position</td></tr> <tr> <td></td><td></td><td>Approx. 5</td><td>Throttle valve wide open throttle</td></tr> </tbody> </table>	(+) term.	(-) term.	Duty (ON %)	Condition	1F	Ground	Approx. 100	Throttle valve closed throttle position			Approx. 5	Throttle valve wide open throttle		
(+) term.	(-) term.	Duty (ON %)	Condition												
1F	Ground	Approx. 100	Throttle valve closed throttle position												
		Approx. 5	Throttle valve wide open throttle												
7	Disconnect dropping resistor connector Is resistance of resistor OK? Resistance: 10-14Ω	Yes	Check wiring and connectors from powertrain control module (Transmission) to dropping resistor If OK, go to next step If not OK, repair wiring and/or connector												
		No	Repair or dropping resistor												
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?	Yes	Replace powertrain control module (Transmission)												
		No	Intermittent poor connection Check for cause												

95H20716

Fig. 50: Flow Chart - Diagnostic Code No. 64

Courtesy of Mazda Motors Corp.

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

Article Text (p. 37)

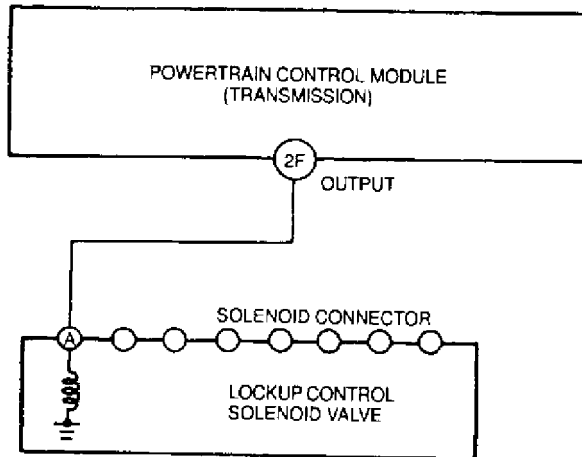
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RX7 & 929



95J20717

Fig. 51: Schematic - Diagnostic Code No. 65
Courtesy of Mazda Motors Corp.

DIAGNOSTIC TROUBLE CODE NO.65				LOCKUP CONTROL SOLENOID VALVE											
STEP	INSPECTION			ACTION											
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?			Yes	Repair or replace connector										
				No	Go to next step										
2	Connect a circuit tester to terminals as shown Is output voltage of lockup control solenoid valve at powertrain control module (Transmission) OK? B+: Battery positive voltage <table border="1"> <tr> <th>(+) term.</th> <th>(-) term.</th> <th>Voltage (V)</th> <th>Condition</th> </tr> <tr> <td rowspan="2">2F</td> <td rowspan="2">Ground</td> <td>B+</td> <td>Lockup</td> </tr> <tr> <td>Below 1.0</td> <td>No lockup</td> </tr> </table>			(+) term.	(-) term.	Voltage (V)	Condition	2F	Ground	B+	Lockup	Below 1.0	No lockup	Yes	Check wiring and go to step 5
				(+) term.	(-) term.	Voltage (V)	Condition								
				2F	Ground	B+	Lockup								
						Below 1.0	No lockup								
No	Go to next step														
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2F and a ground OK? Resistance: 20-40Ω			Yes	Go to step 5										
				No	Go to next step										
4	Disconnect solenoid connector Is resistance between ground and terminal A of lockup control solenoid valve OK? Resistance: 20-40Ω			Yes	Check wiring and connectors from powertrain control module (Transmission) to lockup control solenoid valve If OK, go to next step If not OK, repair wiring and/or connector										
				No	Replace lockup control solenoid valve										
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed?			Yes	Replace powertrain control module (Transmission)										
				No	Intermittent poor connection Check for cause										

95J20718

Fig. 52: Flow Chart - Diagnostic Code No. 65
Courtesy of Mazda Motors Corp.

TESTING

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

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CAUTION: Stall and line pressure tests generate high engine and transmission temperatures. DO NOT hold throttle open more than 5 seconds. Allow engine to idle in "P" or "N" for at least one minute between tests.

Preparation

Check all fluid levels and correct if necessary. Warm engine and transmission to operating temperature. Prior to performing stall, lag time and line pressure tests, block front and rear wheels and set parking brake.

STALL SPEED TEST

Connect tachometer to engine. Ensure engine idle speed and ignition timing is correct. Refer to the appropriate article in the ENGINE PERFORMANCE section. Apply foot brake firmly and shift selector to "D" range. Press accelerator pedal to floor and note maximum RPM. Select "S", "R" and "L" ranges and repeat. Compare with STALL SPEED table.

STALL SPEED

Application		Stall RPM
RX7	3000-3300
929	1950-2250

STALL SPEED RESULTS

High In All Ranges

Insufficient line pressure, worn oil pump. Oil leakage from oil pump, control valve and/or transmission case. Stuck pressure regulator.

High In "D" & "S"

Forward clutch slipping. Forward one-way clutch slipping. Low one-way clutch slipping.

High In "R" Range

Low and reverse brake slipping. Reverse clutch slipping. Perform road test to see if low and/or reverse brake or reverse clutch is at fault. Results indicate the following:

- * Engine braking in "L" range, reverse clutch faulty.
- * No engine braking in "L" range, low and/or reverse brake faulty.

Low In All Ranges

Low engine output. One-way clutch in torque converter slipping.

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TIME LAG TEST

With engine at idle, shift selector from "N" to "D", "N" to "D" HOLD and "N" to "R". Time lag for transmission to engage should be less than one second for "N" to "D" and less than 1.2 seconds for "N" to "R".

TIME LAG RESULTS

Longer Than Specified In "N" To "D" & "N" To "D" HOLD

Low line pressure. Forward clutch slipping. Forward one-way clutch slipping.

High In "N" To "D"

Low line pressure. Low one-way clutch slipping. N-D accumulator not operating properly.

High In "N" To "D" HOLD

Low line pressure. Brake band slipping. 1-2 accumulator not operating properly.

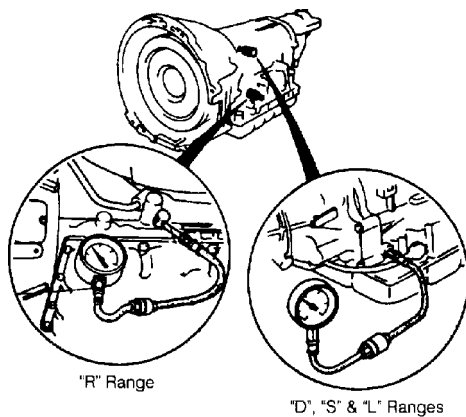
High In "N" To "R"

Low line pressure. Reverse clutch slipping. Low and reverse brake slipping 3-4/N-R. Accumulator not operating properly.

LINE PRESSURE TEST

1) Connect gauges to appropriate line pressure inspection ports. See Fig. 53. Connect tachometer to engine. Ensure engine idle speed and ignition timing is correct. See ENGINE PERFORMANCE section. Apply foot brake firmly and shift selector to "D" range.

2) Press accelerator pedal to floor and note pressure gauge. Release throttle to read pressure at idle. Select "S", "R" and "L" ranges and repeat. Compare with LINE PRESSURE SPECIFICATIONS table.



95A20719

Fig. 53: Connecting Pressure Gauges (RX7 & 929)

Courtesy of Mazda Motors Corp.

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LINE PRESSURE SPECIFICATIONS

AA			
		Idle	Stall
Application	Range	psi (kPa)	psi (kPa)
929	D, S, L	63-68	151-162
		(432-470)	(1040-1118)
	R	87-92	210-222
		(600-638)	(1452-1530)
RX7	D, S, L	72-76	174-184
		(496-524)	(1200-1269)
	R	90-95	218-228
		(621-655)	(1503-1572)
AA			

LINE PRESSURE RESULTS

Low Pressure At Idle (All Ranges)

Worn oil pump. Damaged control piston in oil pump. Pressure regulator valve or plug sticking. Damaged pressure regulator valve spring. Fluid leakage between oil strainer and pressure regulator valve.

Low At Idle In "D", "S" Or "L"

Fluid leakage from hydraulic circuit of forward clutch.

Low At Idle In "D" & "S" HOLD Mode

Fluid leakage from hydraulic circuit of band servo 2nd apply side.

Low At Idle In "R"

Fluid leakage from hydraulic circuit of reverse clutch.

Low At Idle In "R" & "L"

Fluid leakage from hydraulic circuit of low and reverse brake.

High At Idle

Throttle sensor out of adjustment. Damaged thermosensor. Line pressure solenoid sticking. Short circuit of line pressure solenoid circuit. Pressure modifier valve sticking. Pressure regulator valve or plug sticking.

Low At Stall Speed

Throttle sensor out of adjustment. Damaged control piston in oil pump. Line pressure solenoid sticking. Short circuit of line pressure solenoid circuit. Pressure regulator valve or plug sticking. Pressure modifier valve sticking. Pilot valve sticking.

ELECTRICAL COMPONENTS TESTS

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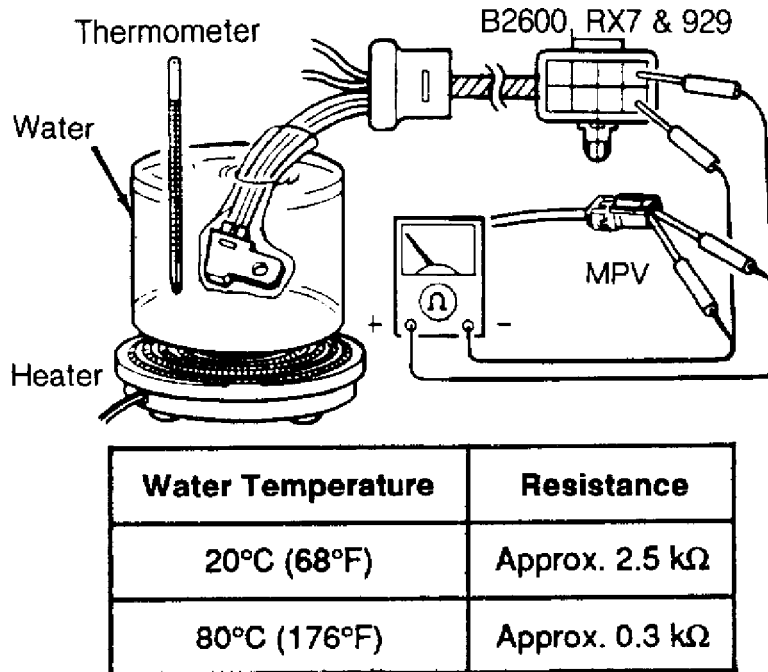
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ATF Thermosensor

Disconnect negative battery cable. Remove oil pan. Remove thermosensor from transmission. Connect ohmmeter to thermosensor terminals. Place thermosensor and thermometer in a container of water. Heat water gradually, checking temperature. See Fig. 54. If resistance is incorrect, replace thermosensor.



95G20905

Fig. 54: Testing ATF Thermosensor
Courtesy of Mazda Motors Corp.

ATF Thermoswitch (4WD)

Disconnect negative battery cable. Remove oil pan and thermoswitch. Place thermoswitch with a thermometer in a container of ATF and gradually heat ATF. Using an ohmmeter, note when thermoswitch closes and opens. Below 293°F (145°C) switch is open, above 302°F (150°C) switch is closed. If thermoswitch does not operate as described, replace thermoswitch.

Dropping Resistor

Disconnect wire connectors at dropping resistor. Resistance across wire connectors should be 10-14 ohms. If not 10-14 ohms, replace dropping resistor.

Hold Switch

1) Turn ignition on. On RX7, connect voltmeter between terminal "D" or terminal "F" and ground. On 929, connect voltmeter between terminal "A" or terminal "B" and ground. See Fig. 55. If voltage is not as specified, check and repair circuit between power source and switch. If voltage is okay, go to next step.

2) Turn ignition off and disconnect hold switch connector.

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See Fig. 56. On RX7, connect ohmmeter between hold switch terminals "D" and "F". On 929, connect ohmmeter between hold switch terminals "A" and "B". If continuity is not correct, replace selector switch or selector lever knob.

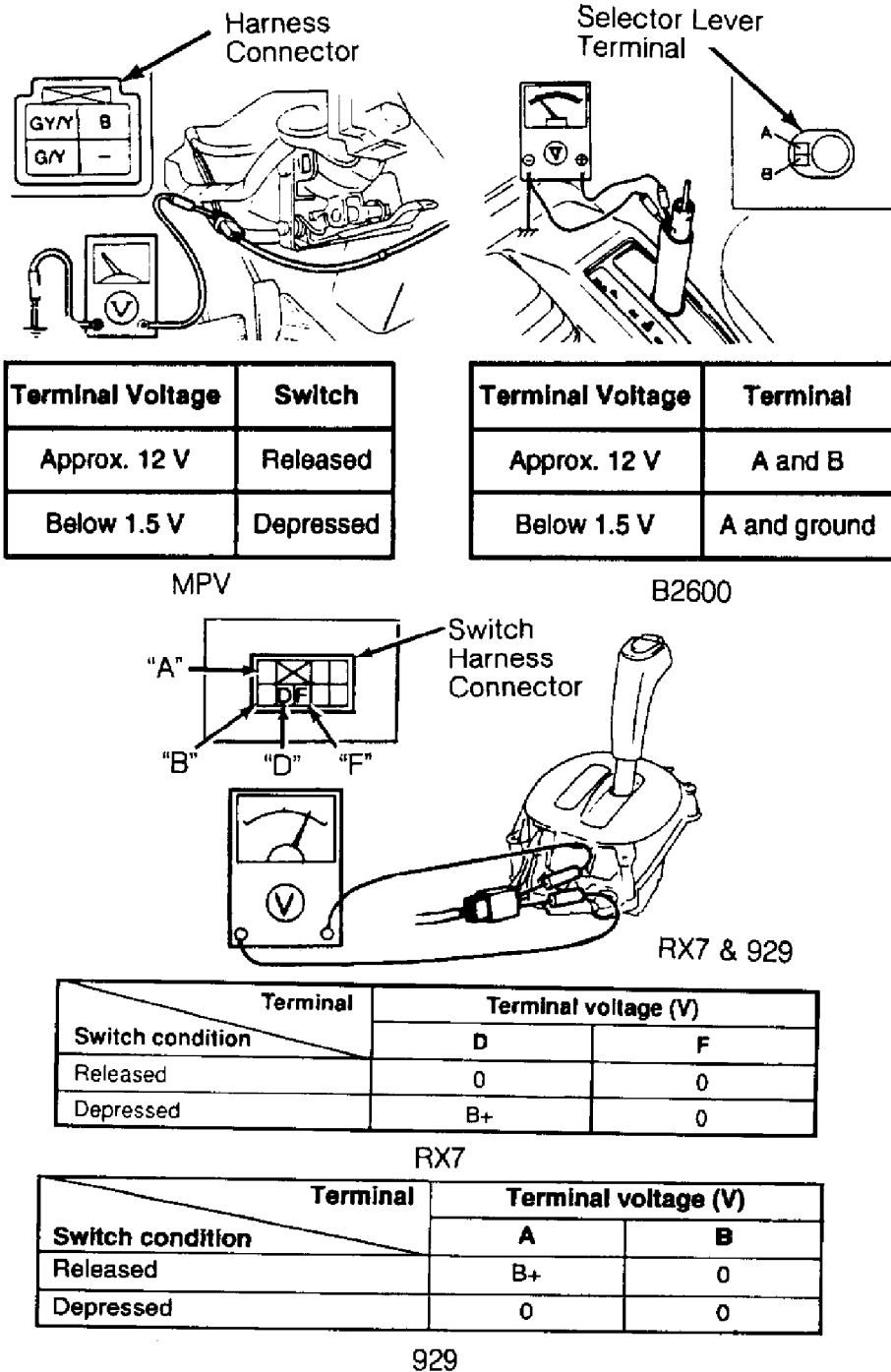


Fig. 55: Checking Hold Switch Voltage
Courtesy of Mazda Motors Corp.

95I20808

AUTO TRANS DIAGNOSIS - RA4A-EL & RB4A-EL

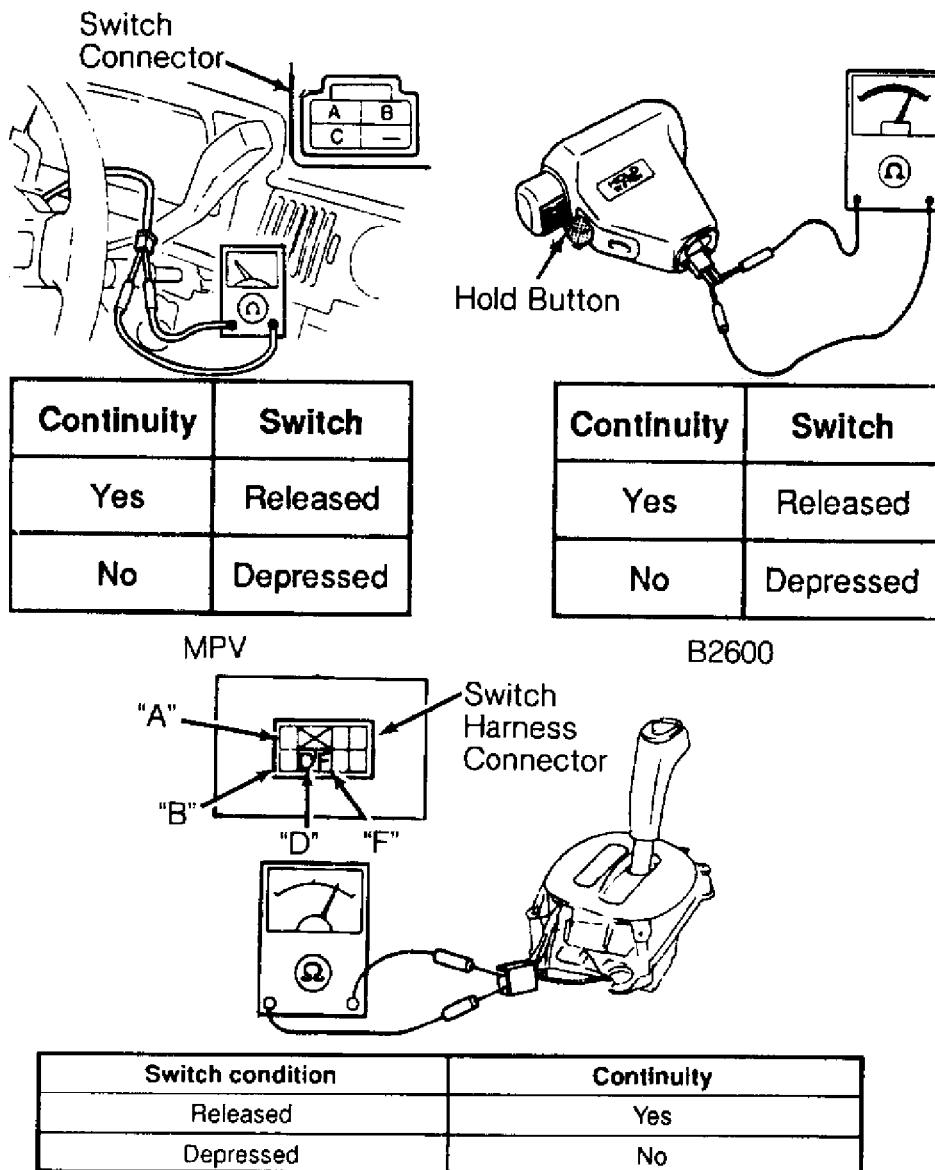
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RX7 & 929

95J20809

Fig. 56: Checking Continuity Of Hold Switch
Courtesy of Mazda Motors Corp.

Inhibitor/Park Neutral Switch

1) Shift selector lever to "P" or "N". Ensure vehicle starts in these positions and not in any other. Ensure back-up lights come on when in "R" and ignition is on.

2) Disconnect wire connectors at inhibitor/park neutral switch on transmission, connect ohmmeter and shift selector to ranges. See Fig. 57. Check continuity between terminals. If continuity is not as specified, adjust or replace switch.

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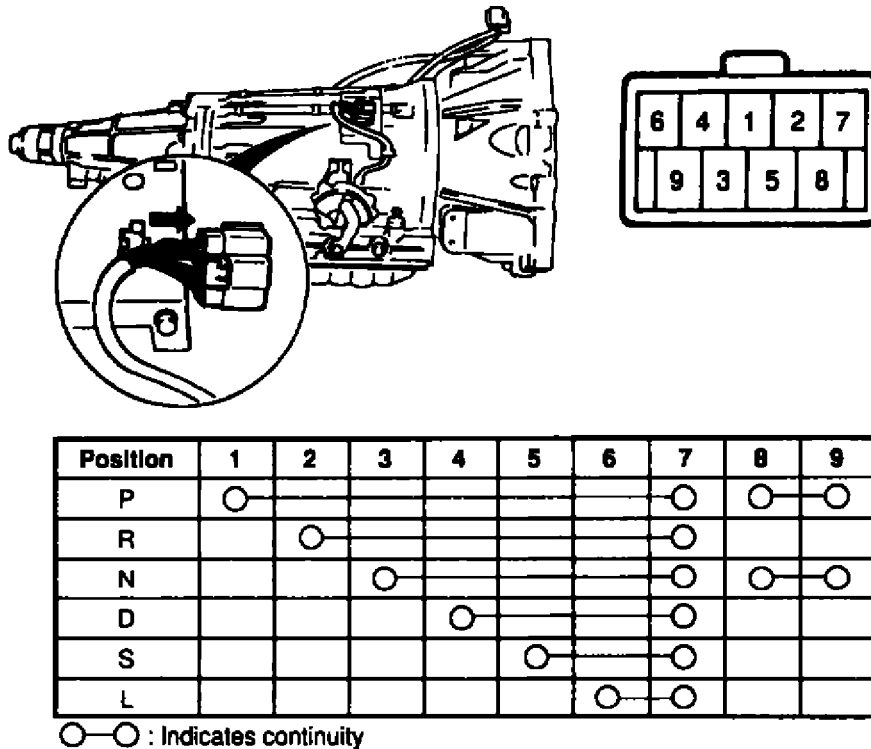
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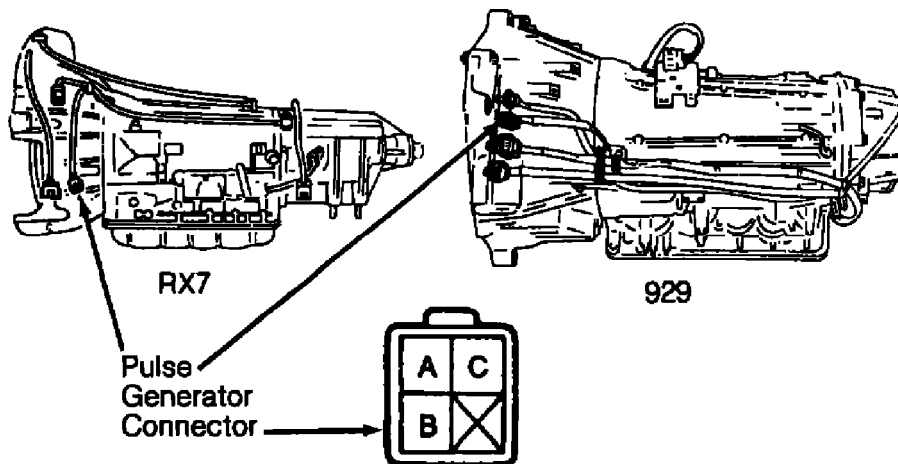
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B2600, RX7 & 929

Fig. 57: Checking Inhibitor/Park Neutral Switch
Courtesy of Mazda Motors Corp.

Pulse Generator (RX7 & 929 Only)

Disconnect 3-wire connector at front of transmission. See Fig. 58. Make sure 2200-3500 ohms are present between terminals "A" and "B". Ensure ohmmeter reads infinity between all other terminal pairs. If not, replace pulse generator.



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Fig. 58: Checking Pulse Generator
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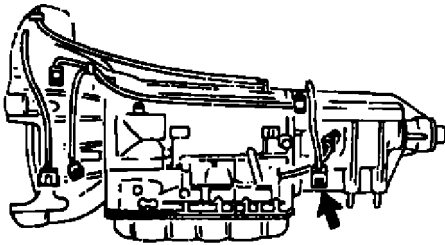
Solenoid Valves

Disconnect solenoid valve connector and measure resistance from respective terminal to ground. See Figs. 59-61. Also, refer to the SOLENOID VALVE RESISTANCE SPECIFICATIONS table. If not as specified, replace solenoid or assembly.



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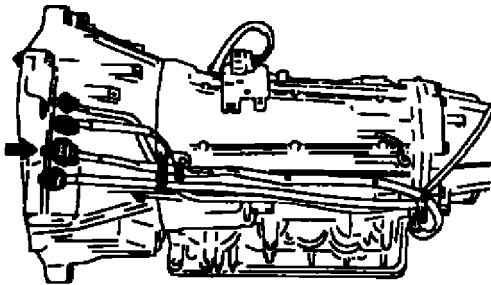
Fig. 59: View of Solenoid Valve Connector
Courtesy of Mazda Motors Corp.



95I20816

RX7

Fig. 60: Checking Solenoid Valves (RX7)
Courtesy of Mazda Motors Corp.



95J20817

929

Fig. 61: Checking Solenoid Valves(929)
Courtesy of Mazda Motors Corp.

SOLENOID VALVE RESISTANCE SPECIFICATIONS

AA			Resistance
Terminal	Solenoid Valve		In Ohms
A	Lock-Up Control		20-40
B	Shift "A"		20-40
C	Shift "B"		20-40
D	Overrunning Clutch		20-40
E	Line Pressure		2.5-5.0
F	Lock-Up		10-20
AA			

Speed Sensor No. 1 (Revolution Sensor)

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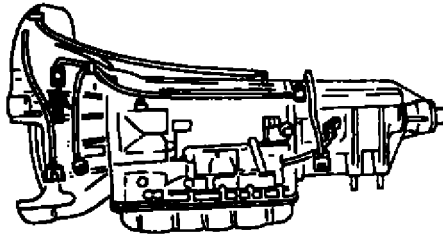
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Disconnect speed sensor wiring connector at transmission. On 929, remove front exhaust pipe. See Figs. 62 and 63. On all models, connect ohmmeter to terminals as indicated. If resistance is not as specified, replace speed sensor.

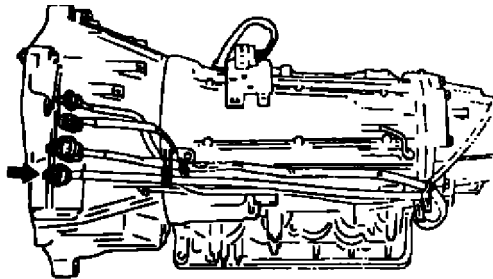


RX7

Terminal	Resistance (Ω)
A and B	500-1,000
B and C	∞
A and C	∞

95F20821

Fig. 62: Checking Revolution Sensor (RX7)
Courtesy of Mazda Motors Corp.



929

Terminal	Resistance (Ω)
A and B	500-1,000
B and C	∞
A and C	∞

95G20822

Fig. 63: Checking Revolution Sensor (929)
Courtesy of Mazda Motors Corp.

Vehicle Speedometer Sensor (RX7 & 929)

1) On RX7, disconnect speedometer connector at instrument panel. Connect an A/C voltmeter to Yellow/White and Yellow/Red wires of instrument panel connector. On 929, disconnect White connector at instrument panel. Connect an A/C voltmeter to Green/Red and Blue/Yellow wires of instrument panel connector.

2) On all models, check for a voltage increase as rear wheel is turned. If no voltage increase occurs, go to next step. If voltage

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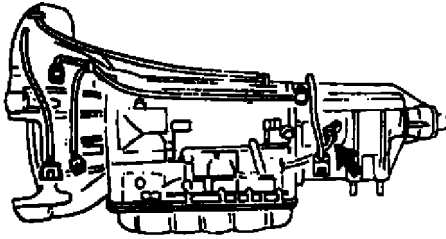
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increases, vehicle speedometer sensor is okay.

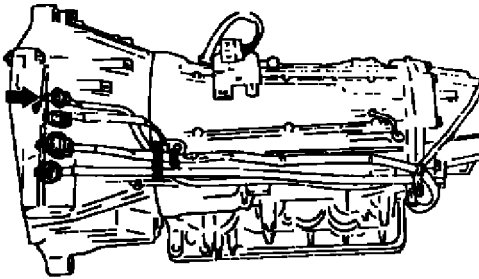
3) Disconnect vehicle speedometer sensor wiring connector at transmission. See Figs. 64 and 65. Connect ohmmeter to terminals. If resistance is not about 290 ohms, replace vehicle speedometer sensor.



RX7

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Fig. 64: Locating Speedometer Sensor Connector (RX7)
Courtesy of Mazda Motors Corp.



929

95I20881

Fig. 65: Locating Speedometer Sensor Connector (929)
Courtesy of Mazda Motors Corp.

PCMT

Turn ignition on. Check voltage at each control unit terminal. See appropriate PCMT terminal voltage chart. See Figs. 66-72. If voltage is not as specified at any terminal, repair or replace component(s) or wiring. If no problem is found with any component or wiring, replace PCMT.

NOTE: For additional electrical circuit information, see WIRING DIAGRAMS at end of this article.

2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1O	1M	1K	1I	1G	1E	1C	1A
2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1P	1N	1L	1J	1H	1F	1D	1B

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Fig. 66: RX7 PCMT Terminal Voltage Chart (1 of 4)
Courtesy of Mazda Motors Corp.

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Terminal	Color	Component	Connected to	Voltmeter		Correct voltage	Condition	Check area
				(+) terminal	(-) terminal			
1A	L/R	Battery (Backup)	Battery	1A	Ground	B+	Constant	• Wiring and/or connector from terminal 1A to battery
1B (Output)	W/G	Shift B solenoid valve	Solenoid valve	1B		B+	P, R, and N ranges or 1st and 2nd gear positions	• Shift B solenoid valve
						Below 1.0V	Third and Fourth gear positions	• Wiring and/or connector from 1B terminal to shift B solenoid valve
1C (Output)	Y	Inhibitor signal	Engine control unit	1C		Below 1.0V	P and N ranges	• Park/Neutral switch, vehicle speed pulse generator, and/or powertrain control module (engine)
						B+	Except P and N ranges	• Wiring and/or connector from terminal 1C to powertrain control module (engine) terminal 1R
1D (Output)	W/R	Shift A solenoid valve	Solenoid valve	1D		B+	P, R, and N ranges or 1st and Fourth gear positions	• Shift A solenoid valve
						Below 1.0V	2nd and Third gear positions	• Wiring and/or connector from terminal 1D to shift A solenoid valve
1E (Input)	R	Park/Neutral switch (R range)	Park/Neutral switch	1E		B+	R range	• Park/Neutral switch
						0V	Except R range	• Wiring and/or connector from terminal 1E to park/neutral switch
1F (Output)	W/L	Line pressure solenoid valve	Solenoid valve	1F		Above 1.5V	Throttle valve closed throttle position	• Line pressure solenoid valve
						Below 1.0V	Throttle valve wide opened throttle	• Wiring and/or connector from terminal 1F to line pressure solenoid valve
1G (Input)	Y/L	Engine rpm signal	Engine control unit	1G		0.3-0.8V	Engine running at idle	• Wiring and/or connector from terminal 1G to powertrain control module (engine) terminal 2B
						0V	Engine stopped	• Powertrain control module (engine)
						1.8-2.2V	Engine running at 3,000 rpm (no load)	
1H (Output)	B/LG	Dropping resistor	Dropping resistor	1H		B+	Throttle valve closed throttle position	• Dropping resistor and/or solenoid valve (line pressure)
						Below 1.0V	Throttle valve wide opened throttle	• Wiring and/or connector between terminal 1H, dropping resistor, and solenoid valve
1I (Input)	G/R	Vehicle speedometer sensor	Speedometer	1I	Ground	2-3V	Vehicle moving	• Vehicle speedometer sensor and/or speedometer
						0V or 4.5-5.5V	Vehicle stopped	• Wiring and/or connector between terminal 1I speedometer, and vehicle speedometer sensor
1J (Ground)	B/L	Ground (Powertrain control module (Transmission))	—	1J		0V	Constant	• Wiring condition.
1K (Output)	Y	Hold indicator / FAT terminal (data link connector)	Combination meter (hold indicator light) and FAT terminal (data link connector)	1K		Below 1.0V	Hold mode	• Wiring and/or connector from terminal 1K to hold indicator light (combination meter)
						B+	Except hold mode	• Hold indicator light
1L (Input)	V/P	A/C signal	A/C relay	1L		Below 3.0V	A/C ON	• Powertrain control module (engine) and/or Air conditioning sensor
						B+	A/C OFF	• Wiring and/or connector from terminal 1L to Air conditioning sensor
1M (Output)	W	Lockup solenoid valve	Solenoid valve	1M		B+	Lockup	• Lockup solenoid valve
						Below 1.0V	No lockup	• Wiring and/or connector from terminal 1M to lockup solenoid valve
1N	B/Y	Battery (main)	Ignition switch	1N		B+	Ignition switch ON	• Meter fuse and/or ignition switch
						0V	Ignition switch OFF	• Wiring and/or connector from terminal 1N to ignition switch (IG1)
1O (Output)	W/Y	Overrunning clutch solenoid valve	Solenoid valve	1O		Below 1.0V	Throttle valve wide opened throttle (D range)	• Overrunning clutch solenoid valve
						B+	Throttle valve closed (D range)	• Wiring and/or connector from terminal 1O to overrunning clutch solenoid valve
1P	B/Y	Battery (main)	Ignition switch	1P		B+	Ignition switch ON	• Meter fuse and/or ignition switch
						0V	Ignition switch OFF	• Wiring and/or connector from terminal 1P to ignition switch (IG1)
2A (Input)	BR/W	Throttle position sensor (V _{TP})	Throttle position sensor	2A	Ground	4.5-5.5V	Ignition switch ON	• Wiring and/or connector from terminal 2A to powertrain control module (engine) terminal 2J
						0V	Ignition switch OFF	• Throttle position sensor

Terminal 1D voltage [shift A solenoid valve] is below 1.0V when in HOLD mode in P, R, and N ranges.

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Fig. 67: RX7 PCMT Terminal Voltage Chart (2 of 4)
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Terminal	Color	Component	Connected to	Voltmeter		Correct voltage	Condition	Check area	
				(+) terminal	(-) terminal				
2B (Input)	Y/G	Park/Neutral switch (D range)	Park/Neutral switch	2B	Ground	B+	D range	<ul style="list-style-type: none">• Park/Neutral switch• Wiring and/or connector from terminal 2B to park/neutral switch	
						0V	Except D range		
2C (Input)	G/Y	Barometric absolute pressure sensor	Powertrain control module (engine)	2C		2.0–4.5V	Ignition switch ON	<ul style="list-style-type: none">• Wiring and/or connector from terminal 2C to powertrain control module (engine) terminal 2D	
						0V	Ignition switch OFF		
2D (Input)	L/Y	Park/Neutral switch (P and N ranges)	Park/Neutral switch	2D	Ground	0V	P and N ranges	<ul style="list-style-type: none">• Park/Neutral switch and/or ignition switch• Wiring and/or connector between terminal 2D park/neutral switch, and ignition switch (STA)	
						B+	Except P and N ranges		
2E (Input)	O	Vehicle speed pulse generator	Vehicle speed vehicle speed pulse generator	2E*1		2L	Approx. above 0.5V AC	Vehicle speed above 25 km/h (16 MPH)	<ul style="list-style-type: none">• Vehicle speed pulse generator• Wiring and/or connector from terminal 2E to vehicle speed pulse generator
							Approx. 0V (AC)	Vehicle stopped (Ignition switch ON)	
2P (Output)	G/W	Lockup control solenoid valve	Solenoid valve	2F	Ground	B+	lockup	<ul style="list-style-type: none">• Lockup control solenoid valve• Wiring and/or connector from terminal 2F to lockup control solenoid valve	
						Below 1.0V	No lockup		
2G (Input)	G/R	Slip lockup OFF signal	Powertrain control module (engine)	2G		Below 1.0V	Engine running at 3,000 rpm	<ul style="list-style-type: none">• Wiring and/or connector from terminal 2G to powertrain control module (engine) terminal 2C• Powertrain control module (engine)	
						B+	Engine running at idle		
2H (Input)	L/G	Torque reduced signal	Powertrain control module (engine)	2H*2		B+	Engine running at idle	<ul style="list-style-type: none">• Wiring and/or connector from terminal 2H to powertrain control module (engine) terminal 2G• Throttle position sensor, vehicle speed sensor vehicle speed pulse generator, and/or powertrain control module (engine)	
						Below 1.0V	Throttle opening above 1/8 (Engine coolant temp below 40°C (104°F))		
2I (Input)	W/Y	Hold switch	Hold switch	2I		B+	Switch depressed	<ul style="list-style-type: none">• Hold switch• Wiring and/or connector from terminal 2I to hold switch	
						0V	Switch released		

*1 Check terminal 2E (vehicle speed pulse generator) voltage by using the AC range.

*2 2H (Torque reduced signal) : Some kinds of testers may give incorrect values. This is because the voltage output period is very short.

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Fig. 68: RX7 PCMT Terminal Voltage Chart (3 of 4)

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Terminal	Color	Component	Connected to	Voltmeter		Correct voltage	Condition	Check area
				(+) terminal	(-) terminal			
2J (Input)	Y/G	Vehicle speed sensor (revolution sensor)	Vehicle speed sensor (revolution sensor)	2J*	2L	Approx. above 1.0V (AC)	Vehicle speed above 25 km/h (16 MPH)	<ul style="list-style-type: none"> Vehicle speed sensor (revolution sensor) Wiring and/or connector from terminal 2J to vehicle speed sensor
						Approx. 0V (AC)	Vehicle stopped	
2K	L/W	TAT terminal (data link connector) / 4GR inhibit signal (auto speed control signal)	TAT terminal (data link connector) and cruise control unit	2K	Ground	4.5-5.5	Ignition switch ON	<ul style="list-style-type: none"> Terminal 1N and 1P voltage Wiring and/or connector from terminal 2K to data link connector TAT terminal Wiring and/or connector from terminal 2K to cruise control unit terminal G
						0V	TAT terminal grounded	
2L (Ground)	W	Ground (input signals)	—	2L		0V	Constant	
2M (Input)	R/W	Idle signal	Powertrain control module (engine)	2M	Ground	4.5-5.5V	Throttle valve opened	<ul style="list-style-type: none"> Throttle position sensor and/or powertrain control module (engine) Wiring and/or connector from terminal 2M to powertrain control module (engine) terminal 2E
						Below 1.0V	Throttle valve closed throttle position	
2N (Input)	B	Water thermo-switch / mileage switch	Water thermo-switch and mileage switch	2N		0V	Engine coolant temp. above 115°C (239°F) or vehicle total mileage above 625 km (388 miles) and vehicle stopped	<ul style="list-style-type: none"> Water thermo-switch and/or mileage switch Wiring and/or connector from terminal 2N to water thermo-switch
						B+	Engine coolant temp. below 110°C (230°F) or vehicle total mileage below 625 km (388 miles) and vehicle stopped	
2O (Input)	LG/R	Stoplight switch	Stoplight switch	2O	Ground	B+	Brake pedal depressed	<ul style="list-style-type: none"> Stoplight switch Wiring and/or connector from terminal 2O to stoplight switch
						0V	Brake pedal released	
2P (Output)	G/W	Reduce torque signal / slip lockup signal	Powertrain control module (engine)	2P*	Ground	Below 1.0V	When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1.5/8. When slip lockup with the throttle opening below 0.5/8.	<ul style="list-style-type: none"> Wiring and/or connector from terminal 2P to powertrain control module (engine) terminal 1Q Throttle position sensor, vehicle speed sensor, vehicle speed pulse generator, lock-up, lockup control solenoid valve, and/or powertrain control module (engine)
						B+	Engine running at idle	
2Q (Input)	BR/W	Park/Neutral switch (L range)	Park/Neutral switch	2Q		B+	L range	<ul style="list-style-type: none"> Park/Neutral switch Wiring and/or connector from terminal 2Q to park/neutral switch
						0V	Except L range	
2R (Input)	R	ATF thermosensor	ATF thermosensor	2R	2L	Approx. 2.4-0.4V	While warming up ATF Note • Approx. 1.8V: ATF temperature 10°C (50°F) • Approx. 1.1V: ATF temperature 40°C (104°F)	<ul style="list-style-type: none"> ATF thermosensor Wiring and/or connector from terminal 2R to ATF thermosensor
2S (Input)	L/R	Park/Neutral switch (S range)	Park/Neutral switch	2S	Ground	B+	S range	<ul style="list-style-type: none"> Park/Neutral switch Wiring and/or connector from terminal 2S to park/neutral switch
						0V	Except S range	
2T (Input)	B/G	Throttle position sensor (TVO)	Throttle position sensor	2T		0.1-1.1V	Throttle valve closed throttle position	<ul style="list-style-type: none"> Throttle position sensor Wiring and/or connector from terminal 2T to throttle position sensor
						4.0-4.5V	Throttle valve wide opened throttle	

* - Check terminal 2J using A/C range.

* - Erratic voltage readings may be found at terminal 2P. Ensure appropriate tester that can read very short voltage outputs is used.

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Fig. 69: RX7 PCMT Terminal Voltage Chart (4 of 4)
Courtesy of Mazda Motors Corp.

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2S	2O	2O	2M	2K	2I	2G	2E	2C	2A	1O	1M	1K	1I	1G	1E	1C	1A
2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1P	1N	1L	1J	1H	1F	1D	1B

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Fig. 70: 929 PCMT Terminal Voltage Chart (1 of 3)

Courtesy of Mazda Motors Corp.

Terminal	Color	Component	Connection to	Voltmeter (+) terminal (-) terminal	Correct voltage	Condition	Possible cause
1A	L/R	Battery (back up)	Battery	1A	B+	Constant	• Wiring and/or connector from terminal 1A to battery
1B (Output)	W	Shift B solenoid valve	Solenoid valve	1B	B+	P, R, and N ranges or 1st and 2nd gear positions	• Shift B solenoid valve
1C (Output)	R/L	Park/Neutral signal	PCME	1C	Below 1.0V	Third and Fourth gear positions	• Park/Neutral switch and/or vehicle speed sensor
1D (Output)	G	Shift A solenoid valve	Solenoid valve	1D	B+	P and N ranges	• Shift A solenoid valve
1E (Input)	R/G	Park/Neutral switch (R range)	Park/Neutral switch	1E	Below 1.0V	Other ranges	• Park/Neutral switch
1F (Output)	R	Line pressure solenoid valve	Solenoid valve	1F	B+	P, R, and N ranges or 1st and Fourth gear positions	• Line pressure solenoid valve and/or dropping resistor
1G (Input)	G/W	Engine rpm signal (Ne1 signal)	Distributor	1G	Below 1.0V	Throttle valve wide open throttle (after ATF warm, engine stopped)	• Distributor
1H (Output)	P	Dropping resistor	Dropping resistor	1H	2—3V	Engine running at idle	• Dropping resistor and/or line pressure solenoid valve
1I (Input)	G/R	Vehicle speedometer sensor	Speedometer	1I	0V or 4.5—5.5V	Throttle valve closed throttle position (after ATF warm, engine stopped)	• Vehicle speedometer sensor and/or combination meter
1J (Ground)	B/LG	Ground (powertrain control module (transmission))	—	1J	0V	Throttle valve wide open throttle (after ATF warm, engine stopped)	• Wiring from terminal 1J to ground
1K (Output)	GY/R	Hold indicator	Combination meter (hold indicator light)	1K	Below 1.0V	Engine stopped	• Combination meter
1L (Input)	Y/W	A/C signal	PCME	1L	B+	Engine running at idle	• PCME and/or A/C system components
1M (Output)	W/R	Lockup solenoid valve	Solenoid valve	1M	Below 1.0V	Engine stopped	• Lockup solenoid valve
1N	B/Y	Battery (main)	Main relay	1N	B+	Throttle valve closed throttle position	• Main relay
1O (Output)	W/B	Overrunning clutch solenoid valve	Solenoid valve	1O	0V	Throttle valve wide open throttle	• Wiring and/or connector from terminal 1N to main relay
1P	B/Y	Battery (main)	Main relay	1P	Below 1.0V	Throttle valve open (D range)	• Overrunning clutch solenoid valve
2A (Input)	BR/W	Throttle position sensor	Throttle position sensor	2A	B+	Throttle valve closed throttle position (D range)	• Main relay
2B (Input)	G/Y	Park/Neutral switch (D range)	Park/Neutral switch	2B	0V	Ignition switch ON	• Wiring and/or connector from terminal 1P to main relay
2C (Input)	V	Barometric absolute pressure sensor	PCME	2C	0V	Ignition switch OFF	• Main relay
					4.5—5.5V	Ignition switch ON	• PCME terminal 1B
					0V	Ignition switch OFF	• Park/Neutral switch
					Approx. above 3.8V	Atmospheric pressure above 98.6 kPa (725 mmHg, 28.5 inHg) (approx. below 400 m (1,312 ft))	• PCME
					Approx. below 3.3V	Atmospheric pressure below 88.0 kPa (660 mmHg, 26.0 inHg) (approx. above 1,200 m (3,937 ft))	• Wiring from terminal 2C to PCME terminal 2G

The terminal 1D voltage [shift A solenoid valve] is below 1.0V when in HOLD mode in P, R, and N ranges.

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Fig. 71: 929 PCMT Terminal Voltage Chart (2 of 3)

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Terminal	Color	Component	Connection to	Voltmeter		Correct voltage	Condition	Possible cause
				(+) terminal	(-) terminal			
2D (Input)	B/Y	Park/Neutral switch (P and N ranges)	Park/Neutral switch	2D	Ground	0V B+	P and N ranges	• Park/Neutral switch
2E (Input)	L/Y	Vehicle speed pulse generator	Vehicle speed pulse generator	2E**	2L	Approx. above 0.5V (AC) Approx. 0V (AC)	Vehicle speed above 25 km/h (16 mph) Engine stopped (ignition switch ON)	• Vehicle speed pulse generator
2F (Output)	O	Lockup control solenoid valve	Solenoid valve	2F	Ground	B+ Below 1.0V	Lockup No lockup	• Lockup control solenoid valve
2G (Output)	P/B	Vehicle speed signal	Not used	2G		2—3V 0V or 4.5—5.5V	Vehicle speed above 25 km/h (16 mph) Vehicle stopped	
2H (Input)	GY	Torque reduced signal	PCME	2H**		B+ Below 1.0V	After engine warm-up Cold engine	• Wiring and/or connector from terminal 2H to PCME terminal 2P • Vehicle speed pulse generator
2I (Input)	L/B	Hold switch	Hold switch	2I		0V B+	Switch depressed Switch released	• Hold switch
2J (Input)	O/L	Vehicle speed sensor (revolution sensor)	Vehicle speed sensor (revolution sensor)	2J**	2L	Approx. above 1.0V (AC) Approx. 0V (AC)	Vehicle speed above 25 km/h (16 mph) Vehicle stopped	• Vehicle speed sensor (revolution sensor)
2K	V	TAT terminal (data link connector) and 4GR inhibit signal (auto speed control signal)	TAT terminal (data link connector) and cruise control unit	2K	Ground	B+ 0V	Ignition switch ON (vehicle stopped) TAT terminal grounded (vehicle stopped)	• Main relay • Terminal 1N and 1P voltage • Wiring and/or connector from terminal 2K to data link connector TAT terminal • Wiring and/or connector from terminal 2K to cruise control unit terminal 1G
2L (Ground)	L/G	Ground (input signals)	—	2L		0V	Constant	• Wiring from terminal 2L to ground
2M (Input)	BR/B	Idle switch	Throttle position sensor	2M	Ground	B+ 0V	Throttle valve open Throttle valve closed throttle position	• Throttle position sensor • Wiring and/or connector from terminal 2M to throttle position sensor
2N (Output)	P/W	FAT terminal (data link connector)	FAT terminal (data link connector)	2N		0V B+	Hold mode Other modes	• Main relay • Terminal 1N and 1P voltage • Wiring and/or connector from terminal 2N to data link connector FAT terminal
2P (Output)	GY/L	Reduce torque signal	PCME	2P		Below 1.0V B+	When shifting Other condition	• Wiring and/or connector from terminal 2P to PCME terminal 1S
2Q (Input)	G	Park/Neutral switch (L range)	Park/Neutral switch	2Q		B+ 0V	L range Other ranges	• Park/Neutral switch
2R (Input)	Y	ATF thermosensor	ATF thermosensor	2R	2L	Approx. 2.4—0.4V	While warming up ATF Note • Approx. 1.8V: ATF temperature 10°C (50°F) • Approx. 1.1V: ATF temperature 40°C (104°F)	• ATF thermosensor
2S (Input)	LG/B	Park/Neutral switch (S range)	Park/Neutral switch	2S	Ground	B+ 0V	S range Other ranges	• Park/Neutral switch
2T (Input)	L	Throttle position sensor	Throttle position sensor	2T		Approx. 0.1—1.1V 3.0—4.3V	Throttle valve closed throttle position Throttle valve wide open throttle	• Throttle position sensor • PCME terminal 2I voltage • Wiring and/or connector from terminal 2T to throttle position sensor

**Check the terminals 2E (vehicle speed pulse generator) and the 2J (vehicle speed sensor) voltage by using the AC range.

**2H (Torque reduced signal): Some kinds of testers may give incorrect values. This is because the voltage output period is very short.

**2P (Reduced torque signal): Some kinds of testers may give incorrect values. This is because the voltage output period is very short.

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Fig. 72: 929 PCMT Terminal Voltage Chart (3 of 3)

Courtesy of Mazda Motors Corp.

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WIRING DIAGRAMS

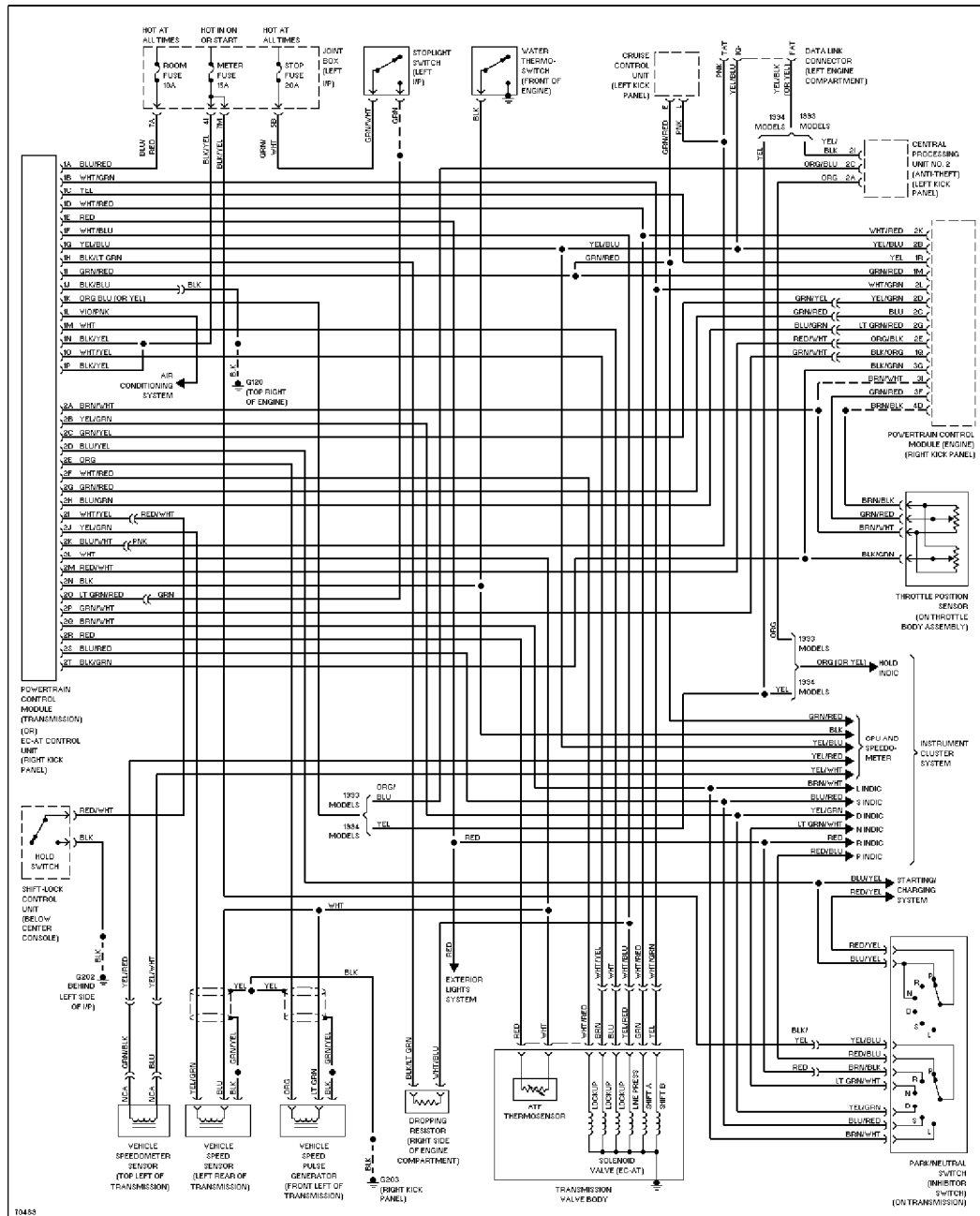


Fig. 73: RX7 Wiring Diagram

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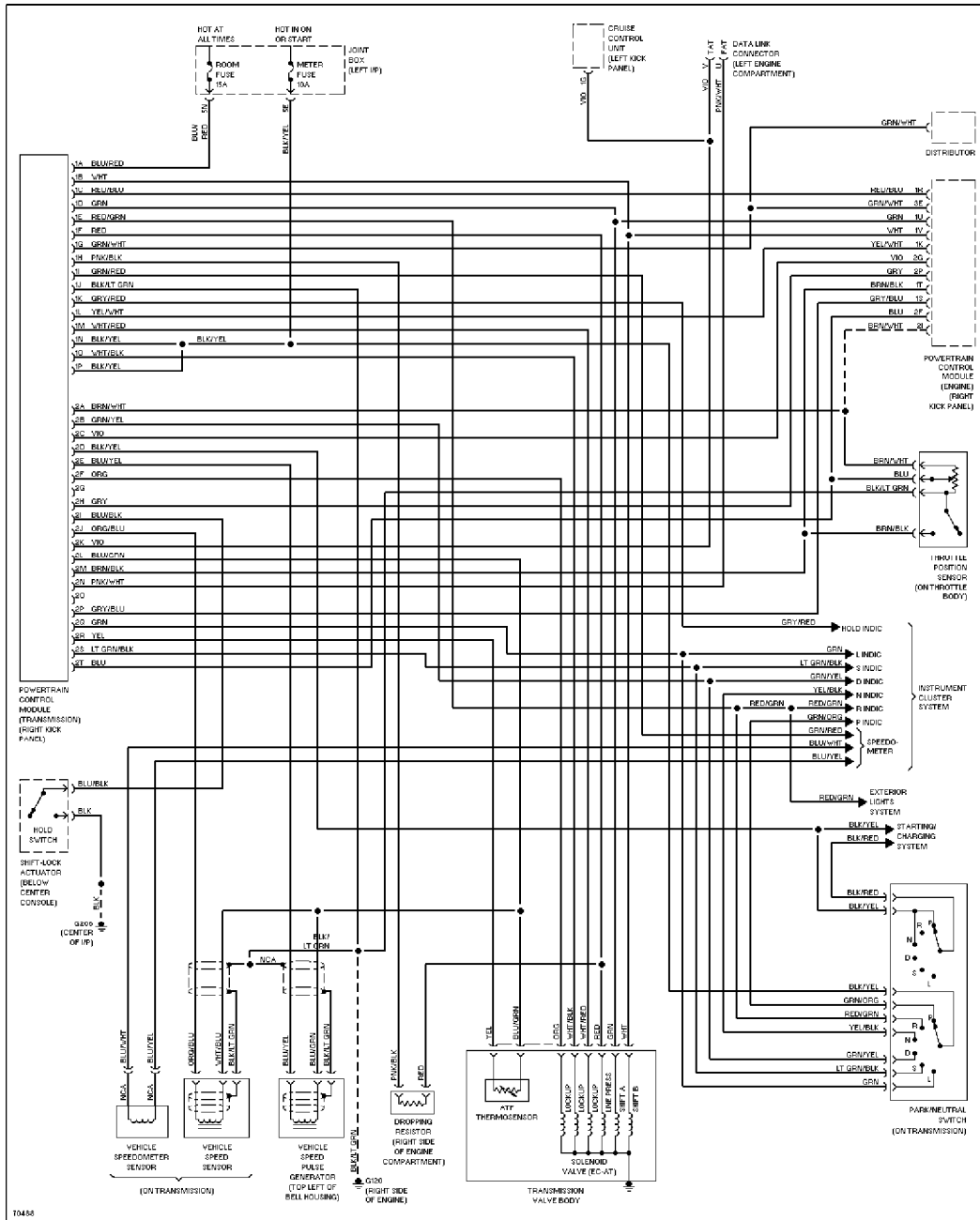


Fig. 74: 929 Wiring Diagram

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