1999 ACCESSORIES & EQUIPMENT

Cruise Control Systems - MX-5 Miata & Protege

DESCRIPTION

WARNING: Deactivate air bag system before performing any service operation. See appropriate AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

Cruise control system uses a vacuum actuator to control throttle position, thus maintaining desired vehicle speed. Based on various inputs, cruise control module controls operation of actuator solenoid.

OPERATION

When cruise control main switch is in ON position, system is ready to be engaged. On Protege, main switch is incorporated into cruise control switch located in steering wheel. On all models, cruise control switch sets or adjusts desired speed. Cruise control switch contains SET/COAST and RESUME/ACCEL switches. System will not operate at speeds less than 25 MPH.

To engage system, accelerate to desired speed (greater than 25 MPH) and momentarily press SET/COAST switch. To disengage system, apply brakes or turn cruise control main switch off.

To accelerate from a set cruising speed, press and hold RESUME/ACCEL switch until vehicle is at desired speed, and then release RESUME/ACCEL switch. To decrease speed, press and hold SET/COAST switch until vehicle is at desired speed, and then release SET/COAST switch.

To resume previous set speed, momentarily press RESUME/ACCEL switch (previous set speed cannot be resumed if system was disengaged using cruise control main switch).

NOTE: System uses 2 switches to determine if brakes are being applied: cruise brake switch (dedicated to cruise control system) and brakelight switch (part of brakelight system).

NOTE: On vehicles with automatic overdrive transmission, if speed drops 9 MPH less than set speed, cruise control module cancels or prevents OD transmission function. When vehicle speed returns to within 2 MPH of set speed for at least 20 seconds, OD

transmission function is restored.

COMPONENT LOCATIONS

COMPONENT LOCATIONS (MX-5 MIATA)

Component	Location
Actuator	Left Rear Corner Of Engine Compartment
Brakelight Switch	On Brake Pedal Bracket
Cruise Brake Switch	On Brake Pedal Bracket
Cruise Control Main Switch	Left Side Of Instrument Panel
Cruise Control Module	Behind Left Kick Panel
Cruise Control Switch	In Wiper Control Lever
Transaxle/Transmission Range Switch (A/T)	On Left Side Of Transmission
Vehicle Speed Sensor	On Transmission

COMPONENT LOCATIONS (PROTEGE)

Component	Location
Actuator	Right Rear Corner Of Engine Compartment
Brakelight Switch	On Brake Pedal Bracket
Cruise Brake Switch	On Brake Pedal Bracket
Cruise Control Main Switch	Integral With Cruise Control Switch In Steering Wheel
Cruise Control Module	Behind Right Kick Panel
Cruise Control Switch	Center Of Steering Wheel
Transaxle/Transmission Range Switch (A/T)	On Top Of Transmission
Vehicle Speed Sensor	On Transmission

ADJUSTMENTS

ACTUATOR CABLE FREE PLAY

Lightly press inner cable at actuator connection. Free play should be .04-.19" (1.0-5.0 mm). Loosen adjusting nuts not cable bracket on actuator. Turn adjusting nuts as necessary until free play is eliminated and throttle lever begins to move. Loosen adjusting nuts 2 turns and check free play. Free play should be .12" (3 mm). Tighten adjusting nuts.

BRAKELIGHT SWITCH & CRUISE BRAKE SWITCH

Disconnect appropriate switch harness connector. Loosen switch adjusting nuts. Back switch out until it does not contact brake pedal. Turn switch in until clearance between switch

housing and pedal stopper is .004-.039" (.10-1.00 mm). Tighten adjusting nuts. Connect switch harness connector.

TRANSMISSION RANGE (TR) SWITCH

MX-5 Miata

Disconnect negative battery cable. Disconnect selector rod. Remove manual shaft nut and selector rod from transmission range switch. Rotate manual shaft to neutral position. Loosen TR switch retaining bolts. Rotate TR switch until groove in TR switch aligns with neutral reference line. See **Fig. 1** . Tighten manual shaft nut to 35-60 ft. lbs. (4.0-6.8 N.m). Install selector rod. Ensure vehicle will only start with transmission in Park or Neutral.

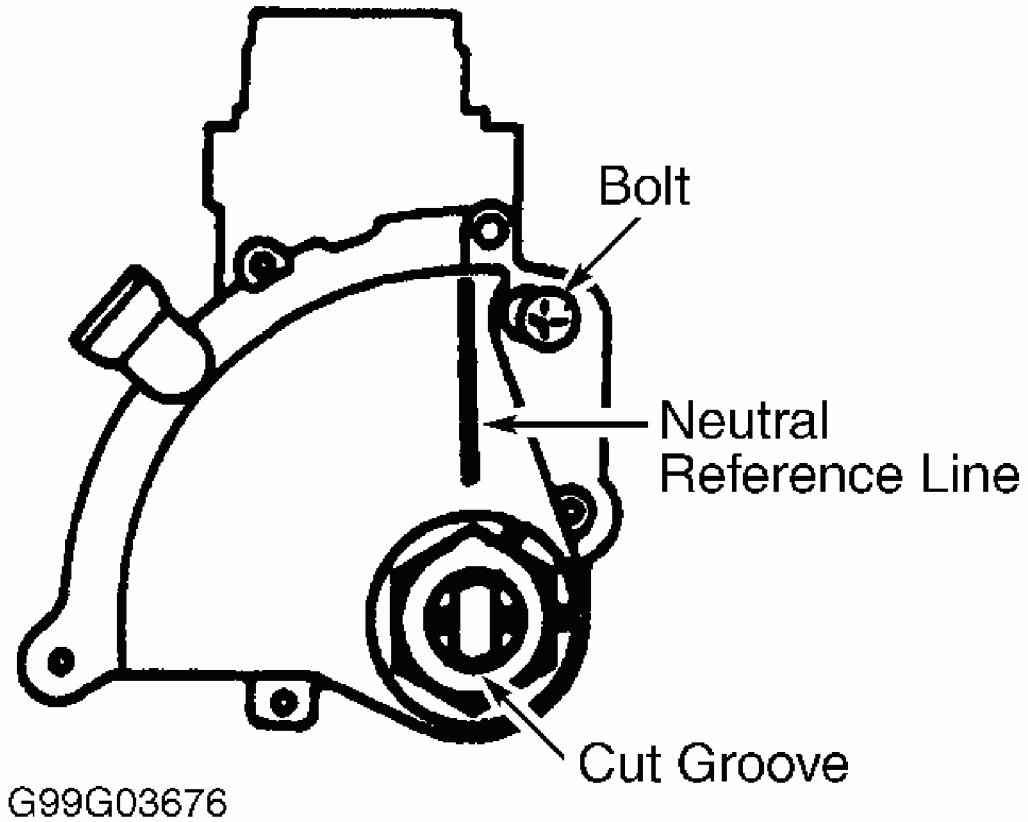

Fig. 1: Adjusting Transmission Range (TR) Switch (MX-5 Miata)
Courtesy of MAZDA MOTORS CORP.

Protege

Disconnect negative battery cable. Disconnect TR switch harness connector. Place transmission in Neutral. Loosen TR switch retaining bolts. Connect an ohmmeter between

terminals "A" and "H" at TR switch. See **Fig. 2** . Adjust switch until there is continuity between terminals "A" and "H" at TR switch. Tighten TR switch retaining bolts to 70-95 INCH lbs. (8-11 N.m). Connect TR switch harness connector. Connect negative battery cable. Ensure vehicle will only start with transmission in Park or Neutral.

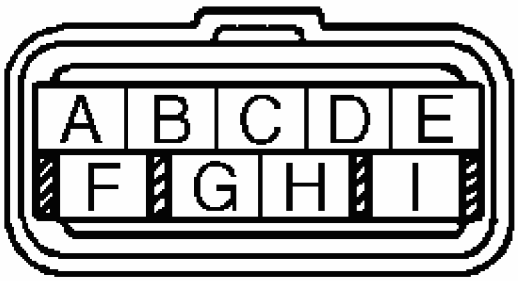

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Fig. 2: Identifying Transmission Range (TR) Switch Terminals (Protege)
Courtesy of MAZDA MOTORS CORP.

COMPONENT TESTS

WARNING: Deactivate air bag system before performing any service operation. See appropriate AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

ACTUATOR

Resistance Test (Protege)

NOTE: Actuator resistance test for MX-5 Miata is not available from the manufacturer.

Disconnect actuator harness connector. Check resistance between specified terminals of actuator. See **Fig. 4** . See **ACTUATOR RESISTANCE SPECIFICATIONS (PROTEGE)** table. If resistance is not as specified, replace actuator. If resistance is as specified, perform **FUNCTION TEST** .

ACTUATOR RESISTANCE SPECIFICATIONS (PROTEGE)

Actuator Terminals	(1) Resistance (Ohms)
A & B	55
B & C	21
B & D	550
(1) Values are approximate.	

Function Test

Disconnect actuator cable from accelerator. Start engine to supply vacuum to actuator diaphragm. Apply battery voltage and ground to specified terminals of actuator and observe actuator arm operation. See **ACTUATOR FUNCTION TEST** table. See **Fig. 3** or **Fig. 4** . If actuator arm does not function as specified, replace actuator.

ACTUATOR FUNCTION TEST

Apply 12 Volts To Terminal	Ground Terminal(s)	(1) Actuator Arm Result
MX-5 Miata		
C	A, B & D	Pull
C	D	Hold
C	A	Extend
Protege		
B	A, C & D	Pull
B	A & D	Hold
B	D	Extend
(1) With voltage and ground not applied, actuator should release.		

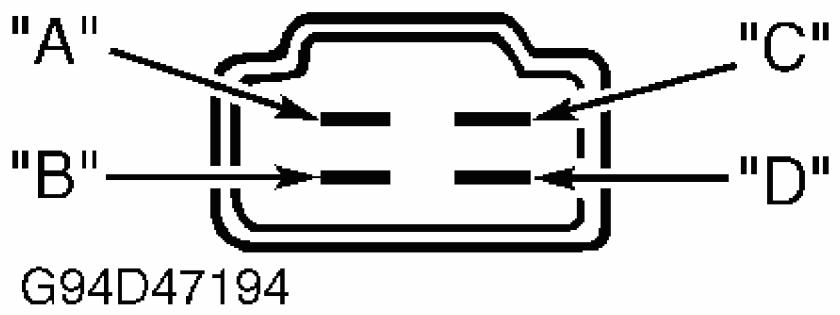

Fig. 3: Identifying Actuator Terminals (MX-5 Miata)
Courtesy of MAZDA MOTORS ORP.

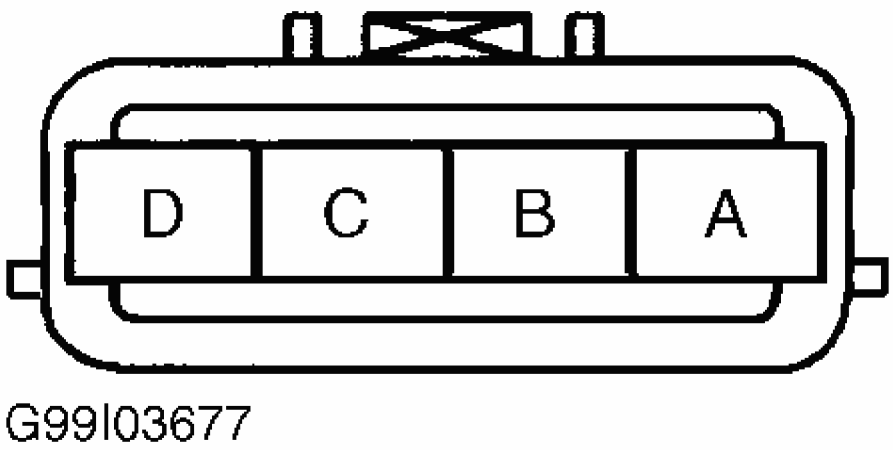

Fig. 4: Identifying Actuator Terminals (Protege)
Courtesy of MAZDA MOTORS CORP.

BRAKELIGHT SWITCH

NOTE: Brakelight switch can be distinguished from cruise brake switch by color of wires connected to switch. See WIRING DIAGRAMS .

Disconnect brakelight switch harness connector. Check continuity between brakelight switch terminals. With brake pedal depressed, continuity should exist. With brake pedal released, continuity should not exist. If continuity is not as specified, replace brakelight switch.

CLOCKSPRING

Remove driver's side air bag. See appropriate AIR BAG RESTRAINT SYSTEMS article. Remove steering column lower cover. Disconnect all clockspring harness connectors. Continuity should exist between indicated terminals. **CLOCKSPRING CONTINUITY TEST** table. See **Fig. 5** . If continuity is not as specified, replace clockspring.

CLOCKSPRING CONTINUITY TEST

Step No.	Continuity Between Terminals
1	1A & 3A
2	1B & 3B

3	2A & 4A
4	2B & 4B
5	2C & 4C
6	2D & 4D

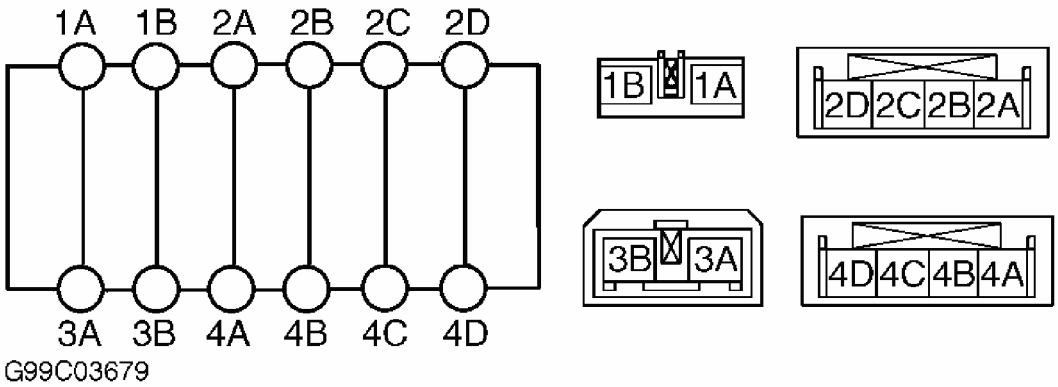

Fig. 5: Identifying Clockspring Terminals
Courtesy of MAZDA MOTORS CORP.

CRUISE BRAKE SWITCH

NOTE: Cruise brake switch can be distinguished from brakelight switch by color of wires connected to switch. See WIRING DIAGRAMS .

Disconnect cruise brake switch harness connector. Check continuity between cruise brake switch terminals. With brake pedal depressed, continuity should not exist. With brake pedal released, continuity should exist. If continuity is not as specified, replace cruise brake switch.

CRUISE CONTROL SWITCH

1. Disable air bag system. See appropriate AIR BAG RESTRAINT SYSTEMS article. Disconnect negative battery cable. On MX-5 Miata, cruise control switch is integral with multifunction switch. Disconnect multifunction switch harness connector. On Protege, disconnect 4-pin harness connector leading to cruise control switch.
2. On all models, check resistance between specified terminals of cruise control switch with switch in specified position. See **CRUISE CONTROL SWITCH RESISTANCE TEST** table. See **Fig. 6** or **Fig. 7** . If resistance is not as specified, replace cruise control switch.

CRUISE CONTROL SWITCH RESISTANCE TEST

Switch Position	Terminals	Specification (1)
MX-5 Miata		
SET/COAST	AE & V	240 Ohms
RESUME/ACCEL	AE & V	910 Ohms
Protege		
Cruise Control Switch ON	A & B	Continuity Exists
SET/COAST	A & C	198 Ohms
RESUME/ACCEL	A & C	68 Ohms
CANCEL Switch Held ON	A & C	418 Ohms
(1) All resistance values are approximate.		

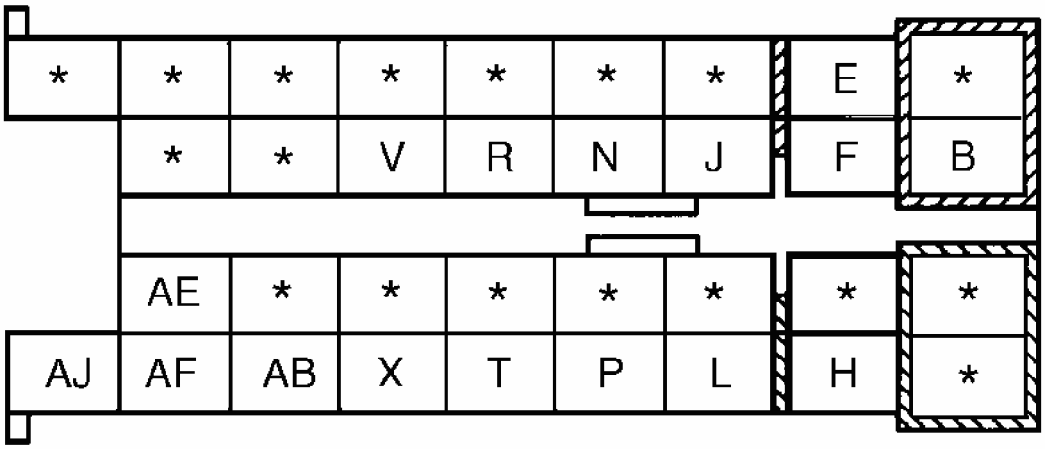

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Fig. 6: Identifying Cruise Control Switch Terminals (MX-5 Miata)
Courtesy of MAZDZ MOTORS CORP.

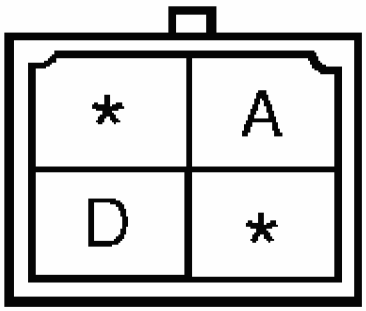

Fig. 7: Identifying Cruise Control Switch Terminals (Protege)
Courtesy of MAZDA MOTORS CORP.

CRUISE CONTROL MAIN SWITCH

NOTE: On Protege, cruise control main switch is incorporated into cruise control switch, located in steering wheel. No separate test is available from the manufacturer.

MX-5 Miata

Disconnect cruise control main switch harness connector. Check continuity between specified terminals of cruise control main switch with switch in specified position. See **CRUISE CONTROL MAIN SWITCH CONTINUITY TEST (MX-5 MIATA)** table. See **Fig. 8** . If continuity is not as specified, replace cruise control main switch.

CRUISE CONTROL MAIN SWITCH CONTINUITY TEST (MX-5 MIATA)

Switch Position	Continuity Between Terminals
Off	(1) A & B
On	A & B; C, D & F
(1) Apply battery voltage across terminals "A" and "B" to test switch back-lighting or terminals "C" and "F" to test indicator light.	

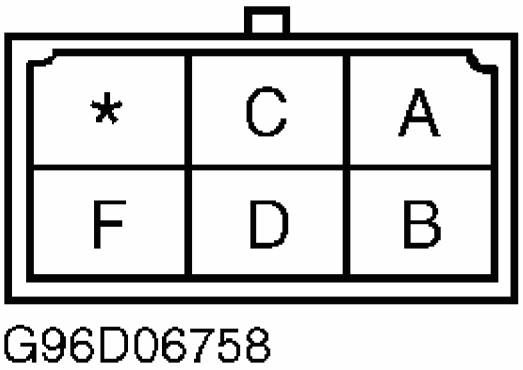

Fig. 8: Cruise Control Main Switch Terminals (MX-5 Miata)
Courtesy of MAZDA MOTORS CORP.

VEHICLE SPEED SENSOR

Remove vehicle speed sensor from transmission. Connect AC voltmeter (5-volt scale) between vehicle speed sensor terminals. See **Fig. 9** . Rotate vehicle speed sensor driven gear by hand. If voltage pulses are detected, vehicle speed sensor is okay. If voltage pulses are not detected, replace vehicle speed sensor.

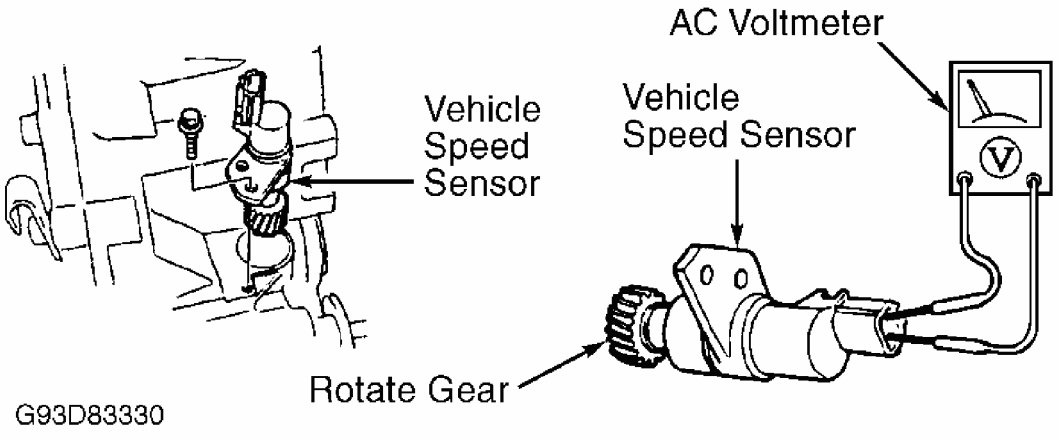

Fig. 9: Checking Vehicle Speed Sensor
Courtesy of MAZDA MOTORS CORP.

CRUISE CONTROL MODULE

1. On Protege, locate cruise control module behind right kick panel. On MX-5 Miata, locate cruise control module behind left kick panel. On all models, leave cruise control module harness connector attached unless otherwise specified.
2. Using DVOM, backprobe specified terminals of cruise control module harness connector while performing appropriate test condition. See **CRUISE CONTROL MODULE PIN VOLTAGE CHART (MX-5 MIATA)** or **CRUISE CONTROL MODULE PIN VOLTAGE CHART (PROTEGE)** . See **Fig. 10** .
3. If voltage measurements or continuity measurements are not as specified, check the related components and wiring. See **WIRING DIAGRAMS** . If related components and wiring are okay, but system is still not functioning properly, replace cruise control module.

CRUISE CONTROL MODULE PIN VOLTAGE CHART (MX-5 MIATA)

Terminal (Signal)/Test Condition	Voltage
A (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
B (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
C (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
D (Indicator Light Output)	
Ignition On	Battery Voltage
Ignition LOCK Or ACC	0 Volts
E (Main Switch)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
G (TCM O/D Off)	
Ignition On	Battery Voltage
Ignition LOCK Or ACC	0 Volts
H (Actuator Power Supply)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
I (Data Link Connector)	(1)
J (Transmission Range Switch - A/T)	
Ign., Main Sw. On, Gear Not In Park Or Neutral	Battery Voltage
Igni. On, Main Sw. Off, Selector In Park Or Neutral	0 Volts

J (Clutch Switch - M/T)	
Ign. On, Clutch Pedal Released	Battery Voltage
Ign. On, Clutch Pedal Depressed	0 Volts
M (Brakelight Switch)	
Brake Pedal Depressed	Battery Voltage
Brake Pedal Released	0 Volts
N (Cruise Control Switch)	
Ignition On, SET/COAST Switch Depressed	1.5 Volts
Ignition On, RESUME/ACCEL Switch Depressed	3.1 Volts
Ignition On, Other	5 Volts
O (Cruise Brake Switch)	
Ignition On, Main Sw. On, Brake Pedal Released	Battery Voltage
Ignition On, Main Switch On, Brake Pedal Depressed	0 Volts
P (Vehicle Speed Sensor)	
Ign. On, Main Sw. On, Rear Tires Rotating	Alternating Between 0-5 Volts AC
T (Ground) At All Times	(2) Continuity To Ground

(1) Information is not available from manufacturer.

(2) Turn ignition switch to LOCK position. Disconnect cruise control module harness connector. Measure resistance between ground and terminal "T".

CRUISE CONTROL MODULE PIN VOLTAGE CHART (PROTEGE)

Terminal (Signal)/Test Condition	Value
A (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
B (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
C (Actuator Control)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
D (Indicator Light Output)	
Ignition On	Battery Voltage
Ignition LOCK Or ACC	0 Volts
E (IG1)	

Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
G (PCM O/D Off)	
Ignition On	Battery Voltage
Ignition LOCK Or ACC	0 Volts
H (Cruise Brake Switch)	
Ignition On, Main Switch On	Battery Voltage
Ignition On, Main Switch Off	0 Volts
I (Data Link Connector)	(1)
J (Clutch Switch - M/T)	
Ign. On, Main Sw. On, Clutch Pedal Released	Battery Voltage
Ign. On, Main Sw. Off, Clutch Pedal Depressed	0 Volts
J (Transmission Range Switch - A/T)	
Ign. On, Main Sw. On, Not In Park Or Neutral	Battery Voltage
Ign. On, Main Sw. Off, In Park Or Neutral	0 Volts
K (Brake Cruise Switch	
Brake Pedal Depressed	Battery Voltage
Brake Pedal Released	0 Volts
L (Cruise Control Switch Position)	
Ign. On, Main Sw. On, SET/COAST Sw. Depressed	1.5 Volts
Ign. On, Main Sw. On, RESUME/ACCEL Sw. Depressed	0.5 Volts
Ign. On, Main Sw. On, CANCEL Sw. Depressed	3 Volts
Ign On, Other	5 Volts
M (Brakelight Switch)	
Brake Pedal Depressed	Battery Voltage
Brake Pedal Released	0 Volts
N (Vehicle Speed Sensor)	
Ign. On, Rear Tires Rotating	Alternating 0-5 Volts
Ign On, Rear Tires Not Rotating	0 Or 5 Volts
O (Cruise Control Main Switch Input)	
Ign. On, Main Sw. Off,	Battery Voltage
Ign. On, Main Sw. On	0 Volts
P (Ground) At All Times	(2) Continuity To Ground

(1) Information is not available from manufacturer.

(2) Turn ignition switch to LOCK position. Disconnect cruise control module harness

connector. Measure resistance between ground and appropriate terminal.

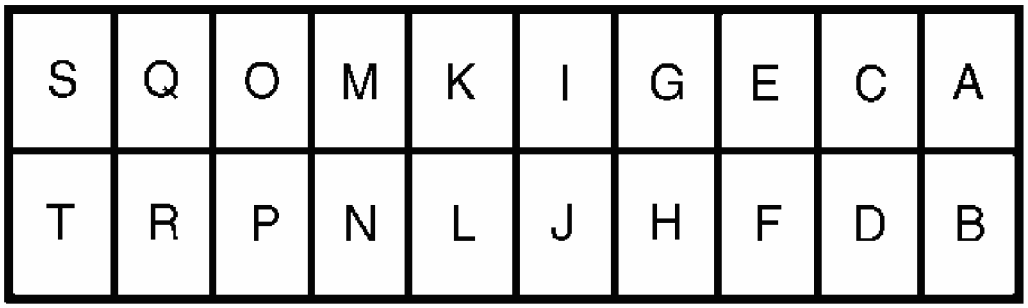

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Fig. 10: Identifying Cruise Control Module Connector Terminals (MX-5 Miata & Protege)
Courtesy of MAZDA MOTORS CORP.

TRANSMISSION RANGE SWITCH

Disconnect Transmission Range (TR) switch harness connector. Check continuity between appropriate TR switch terminals with gear selector in appropriate position. See **TR SWITCH CONTINUITY** table. See **Fig. 2** or **Fig. 11** . If continuity is not as specified, replace TR switch.

TR SWITCH CONTINUITY

Gear Position	Continuity Between Terminals
MX-5 Miata	
P (Park)	B & I, D & C
R (Reverse)	F & I
N (Neutral)	A & F, B & H
D (Drive)	H & I
2 (2nd Gear)	E & I
1 (1st Gear)	G & I
Protege	
P (Park)	A & E, F & I
R (Reverse)	A & D
N (Neutral)	A & H, F & I
D (Drive)	A & B

2 (2nd Gear)	A & G
1 (1st Gear)	A & C

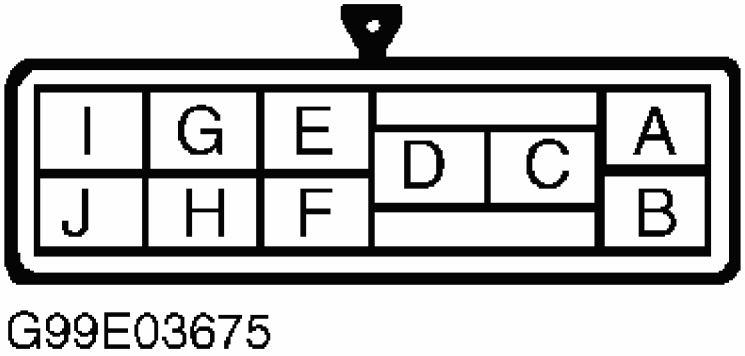

Fig. 11: Transmission Range Switch Terminals (MX-5 Miata)
Courtesy of MAZDA MOTORS CORP.

SELF-DIAGNOSTIC SYSTEM

One of two on-board diagnostic modes may be utilized. The CONDITION DETECTION MODE indicates trouble in cruise control system. The OPERATION MODE checks correct input signals to the cruise control module. Modes are performed using either the New Generation Star (NGS) tester or cruise indicator light.

Perform OPERATION MODE first. If system passes all operation modes, perform CONDITION DETECTION MODE. If condition detection mode does not output any DTCs, check components in the following order: main switch, cruise control module, cruise brake switch, brakelight switch, cruise control switch, actuator, and vehicle speed sensor. See **COMPONENT TESTS** . If no components are defective repair wiring as necessary. See **WIRING DIAGRAMS** .

OPERATION MODE

NOTE: To cancel operation mode, turn ignition switch to LOCK position or turn cruise control main switch off.

Using New Generation Star (NGS) Tester

1. Connect New Generation Star (NGS) tester (49-T088-0A0) and Adapter (49-T088-004) according to manufacturer's instructions. Turn ignition switch to ON position. Ensure

cruise control main switch is off. Turn (press on Protege) and hold RESUME/ACCEL switch then press cruise control main switch to activate system inspection. Cruise indicator light should illuminate.

2. Set tester adapter switch to AUX 2. Using NGS tester, select VEHICLE & ENGINE SELECTION and press TRIGGER. Select DIAGNOSTIC DATA LINK and press TRIGGER. Select CCM - CRUISE CONTROL MODULE and press TRIGGER. Select DIAGNOSTIC TEST MODE and press TRIGGER. Select CRUISE CONTROL INPUT SW SELF TEST and press TRIGGER. Press START button.
3. Press SET/COAST switch. If SET/COAST SW-PRESS is displayed on NGS tester, go to next step. If SET/COAST SW-PRESS is not displayed on NGS tester, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
4. Press RESUME/ACCEL switch. If RESUME/ACCEL SW-PRESS is displayed on NGS tester, go to next step. If RESUME/ACCEL SW-PRESS is not displayed on NGS tester, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
5. Depress brake pedal. If BRAKE PEDAL-DEPRESS is displayed on NGS tester, go to next step (A/T models) or step 7 (M/T models). If BRAKE PEDAL-DEPRESS is not displayed on NGS tester, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
6. Place gear selector in Neutral. If N RANGE NEUTRAL POSITION-SHIFT is displayed on NGS tester, go to step 8 . If N RANGE NEUTRAL POSITION-SHIFT is not displayed on NGS tester, check transmission range switch circuit. See **TRANSMISSION RANGE (TR) SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
7. Depress clutch pedal. If N RANGE NEUTRAL POSITION-SHIFT is displayed on NGS tester, go to next step. If N RANGE NEUTRAL POSITION-SHIFT is not displayed on NGS tester, check clutch switch circuit. See **CLUTCH SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
8. Drive vehicle at a speed greater than 25 MPH. If VEHICLE SPEED-ABOVE 40 KM/H (25 MPH) is displayed on NGS tester, operation mode has passed. Perform condition detection mode. See **CONDITION DETECTION MODE** . If VEHICLE SPEED-ABOVE 40 KM/H (25 MPH) is not displayed on NGS tester, check vehicle speed sensor circuit. See **VEHICLE SPEED SENSOR CIRCUIT** under DIAGNOSTIC TESTS.

Using Cruise Indicator Light

NOTE: If RESUME/ACCEL switch is malfunctioning, cruise indicator light will not provide a correct indication when cruise system is inspected. Use NGS tester procedure.

NOTE: On 2-digit output patterns, a short pause separates each digit of

output pattern (example of output pattern 21: 2 long flashes, short pause, 1 short flash). If no output pattern is present, light will not flash.

1. Turn ignition switch to ON position. Ensure cruise control main switch is off. Press and hold RESUME/ACCEL switch then press cruise control main switch to activate system inspection. Cruise indicator light should illuminate.
2. Press SET/COAST switch. If output pattern 21 is retrieved, go to next step. If output pattern 21 is not retrieved, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
3. Press RESUME/ACCEL switch. If output pattern 22 is retrieved, go to next step. If output pattern 22 is not retrieved, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
4. Depress brake pedal. If output pattern 31 is retrieved, go to next step (A/T models) or step 6 (M/T models). If output pattern 31 is not retrieved, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
5. Place gear selector in Park or Neutral. If output pattern 35 is retrieved, go to step 7 . If output pattern 35 is not retrieved, check transmission range switch circuit. See **TRANSMISSION RANGE (TR) SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
6. Depress clutch pedal. If output pattern 35 is retrieved, go to next step. If output pattern 35 is not retrieved, check clutch switch circuit. See **CLUTCH SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
7. Drive vehicle at a speed greater than 25 MPH. If output pattern 37 is retrieved, operation mode has passed. Perform condition detection mode. See CONDITION DETECTION MODE. If output pattern 37 is not retrieved, check vehicle speed sensor circuit. See **VEHICLE SPEED SENSOR CIRCUIT** under DIAGNOSTIC TESTS.

CONDITION DETECTION MODE

Using New Generation Star (NGS) Tester

1. Connect New Generation Star (NGS) tester (49-T088-0A0) and Adapter (49-T088-004) according to manufacturer's instructions. Start vehicle and let idle. Set tester adapter switch to AUX 2. Using NGS tester, select VEHICLE & ENGINE SELECTION and press TRIGGER. Select DIAGNOSTIC DATA LINK and press TRIGGER. Select CCM - CRUISE CONTROL MODULE and press TRIGGER. Select DIAGNOSTIC TEST MODE and press TRIGGER. Select CRUISE CONTROL SELF TEST and press TRIGGER. Press START.
2. If NO CODES RETRIEVED is not displayed on NGS tester, go to next step. If NO CODES RETRIEVED is displayed on NGS tester, go to step 9 .
3. If ACTUATOR OR STOPLIGHT SW-DEFECT is not displayed on NGS tester, go to next step. If ACTUATOR OR STOPLIGHT SW-DEFECT is displayed on NGS tester, check actuator circuit. See **ACTUATOR CIRCUIT** under DIAGNOSTIC TESTS.

4. If STOP FUSE OR WIRING is not displayed on NGS tester, go to next step. If STOP FUSE OR WIRING is displayed on NGS tester, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
5. If STOPLIGHT SWITCHES is not displayed on NGS tester, go to next step. If STOPLIGHT SWITCHES is displayed on NGS tester, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
6. If SET/COAST SW-DEFECT is not displayed on NGS tester, go to next step. If SET/COAST SW-DEFECT is displayed on NGS tester, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
7. If RESUME/ACCEL SW-DEFECT is not displayed on NGS tester, go to next step. If RESUME/ACCEL SW-DEFECT is displayed on NGS tester, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
8. If CRUISE CONTROL MODULE W-DEFECT is displayed on NGS tester, replace cruise control module. If CRUISE CONTROL MODULE W-DEFECT is not displayed on NGS tester, no cruise control module DTCs exist at this time. Go to next step.
9. To cancel CONDITION DETECTION MODE, turn ignition switch to LOCK position or turn cruise control main switch off.

Using Cruise Indicator Light

NOTE: If RESUME/ACCEL switch is malfunctioning, cruise indicator light will not provide a correct indication when cruise system is inspected. Use NGS tester in condition detection mode.

1. Turn ignition switch to ON position. Turn cruise control main switch on. Ensure cruise indicator light illuminates. If cruise indicator light does not illuminate, service before continuing.
2. Press and hold RESUME/ACCEL switch for at least 3 seconds. Cruise indicator light will illuminate for 3 seconds, and then go out for 2 seconds. Cruise indicator light will flash condition detection mode DTCs (if set). On 2-digit DTCs, a short pause separates each digit of DTC (example of DTC 15: long flash, short pause, 5 short flashes). If no DTCs are set, light will not flash. If no DTCs exist, go to step 9 . If any DTCs exist, go to next step.
3. If DTC 01 does not exist, go to next step. If DTC 01 exists, check actuator circuit. See **ACTUATOR CIRCUIT** under DIAGNOSTIC TESTS.
4. If DTC 05 does not exist, go to next step. If DTC 05 exists, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
5. If DTC 07 does not exist, go to next step. If DTC 07 exists, check brake switch circuit. See **BRAKE SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
6. If DTC 11 does not exist, go to next step. If DTC 11 exists, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.

7. If DTC 12 does not exist, go to next step. If DTC 12 exists, check cruise control switch circuit. See **CRUISE CONTROL SWITCH CIRCUIT** under DIAGNOSTIC TESTS.
8. If DTC 15 exists, replace cruise control module. If DTC 15 does not exist, no cruise control module DTCs exist at this time. Go to next step.
9. To cancel condition detection mode, drive vehicle at a speed greater than 10 MPH or turn cruise control main switch off. Ensure cruise indicator light goes out.

DIAGNOSTIC TESTS

NOTE: These tests are only to be used when sent here to from SELF-DIAGNOSTIC SYSTEM .

ACTUATOR CIRCUIT

MX-5 Miata

1. Check wiring harness between cruise control module and actuator. See **WIRING DIAGRAMS** . If wiring harness is okay, go to next step. If wiring harness is damaged, repair as necessary.
2. Disconnect actuator harness connector. Turn ignition on. Turn cruise control main switch on. Measure voltage at terminal "C" (Blue wire) at actuator harness connector. See **Fig. 3** . If battery voltage exists, go to step 6 . If battery voltage does not exist, go to next step.
3. Measure voltage at terminal 2B (Yellow wire) at brake switch harness connector. If battery voltage exists, repair short to voltage in Yellow wire. If battery voltage does not exist, go to next step.
4. Measure voltage at terminal 2A (Pink wire) at brake switch harness connector. If battery voltage exists, replace brake switch. If battery voltage does not exist, go to next step.
5. Remove lower left instrument panel cover. Remove cruise control module with harness still connected. Using voltmeter, backprobe cruise control module harness connector terminal "H" (Yellow wire). If battery voltage exists, repair short to voltage in Yellow wire. If battery voltage does not exist, Replace cruise control module.
6. Connect cruise control actuator harness connector. Turn ignition on. Turn cruise control main switch on. Using voltmeter, backprobe actuator harness connector terminal "B" (Green/Yellow wire). If battery voltage exists, go to next step. If battery voltage does not exist, replace cruise control actuator. See **ACTUATOR** under REMOVAL & INSTALLATION.
7. Measure voltage at actuator harness connector terminal "D" (Green/Black wire). If battery voltage exists, go to next step. If battery voltage does not exist, replace cruise control actuator. See **ACTUATOR** under REMOVAL & INSTALLATION.

Protege

1. Check wiring harness between cruise control module and actuator. See **WIRING DIAGRAMS** . If wiring harness is okay, go to next step. If wiring harness is damaged, repair as necessary.
2. Disconnect actuator harness connector. Turn ignition and cruise control main switch to ON position. Measure voltage at terminal "B" (Green/Black wire) at actuator harness connector. See **Fig. 10** . If battery voltage exists, go to step 6 . If battery voltage does not exist, go to next step.
3. Measure voltage at terminal 2B (Pink wire) at brake switch harness connector. If battery voltage exists, repair short to voltage in Pink wire. If battery voltage does not exist, go to next step.
4. Measure voltage at terminal 2A (Violet/Red wire) at brake switch harness connector. If battery voltage exists, replace brake switch. If battery voltage does not exist, go to next step.
5. Remove right kick panel cover. Remove cruise control module with harness still connected. Using voltmeter, backprobe cruise control module harness connector terminal "H" (Violet/Red wire). If battery voltage exists, repair short to voltage in Violet/Red wire. If battery voltage does not exist, replace cruise control module.
6. Connect cruise control actuator harness connector. Turn ignition on. Turn cruise control main switch on. Using voltmeter, backprobe actuator harness connector terminal "D" (Green wire). If battery voltage exists, go to next step. If battery voltage does not exist, replace cruise control actuator. See **ACTUATOR** under REMOVAL & INSTALLATION.
7. Measure voltage at actuator harness connector terminal "A" (Green/Orange wire). If battery voltage exists, go to next step. If battery voltage does not exist, replace cruise control actuator. See **ACTUATOR** under REMOVAL & INSTALLATION.
8. Measure voltage at actuator harness connector terminal "C" (Pink wire). If battery voltage exists, replace cruise control module. If battery voltage does not exist, replace cruise control actuator. See **ACTUATOR** under REMOVAL & INSTALLATION.

BRAKE SWITCH CIRCUIT

MX-5 Miata

1. Turn ignition switch to ON position. Depress brake pedal and observe brakelight operation. If brakelights do not illuminate, go to next step. If brakelights illuminate, go to step 6 .
2. Inspect STOP (15-amp) fuse in instrument panel fuse box. If fuse is okay, go to next step. If fuse is faulty, repair short to ground in brakelight system.
3. Ensure STOP fuse is installed. Depress and hold brake pedal. Using a voltmeter, backprobe terminal 1B (Green wire) at brakelight switch harness connector. If battery voltage exists, release brake pedal and go to step 5 . If battery voltage does not exist, release brake pedal and go to next step.

4. Using a voltmeter, backprobe terminal 1A (White/Green wire) at brakelight switch harness connector. If battery voltage exists, replace brakelight switch. If battery voltage does not exist, repair open in White/Green wire between instrument panel fuse box and brakelight switch.
5. Access cruise control module, located behind left kick panel. Depress and hold brake pedal. Using a voltmeter, backprobe terminal "M" (Green wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, replace cruise control module. If battery voltage does not exist, repair open in Green wire between cruise control module and brakelight switch.
6. Access cruise control module, located behind left kick panel. Depress and hold brake pedal. Using a voltmeter, backprobe terminal "M" (Green wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, go to next step. If battery voltage does not exist, repair open in Green wire between cruise control module and brakelight switch.
7. Turn ignition switch and cruise control main switch to ON position. Depress brake pedal. Measure voltage at terminal "O" (Pink wire) at cruise control module harness connector. If voltage exists, replace cruise control module. If no voltage exists, replace brake switch.

Protege

1. Turn ignition switch to ON position. Depress brake pedal and observe brakelight operation. If brakelights do not illuminate, go to next step. If brakelights illuminate, go to step 6 .
2. Inspect STOP (15-amp) fuse in instrument panel fuse box. If fuse is okay, go to next step. If fuse is blown, repair short to ground in brakelight system.
3. Ensure STOP fuse is installed. Depress and hold brake pedal. Using a voltmeter, backprobe terminal 1B (Green/Yellow wire) at brakelight switch harness connector. If battery voltage exists, release brake pedal and go to step 5 . If battery voltage does not exist, release brake pedal and go to next step.
4. Using a voltmeter, backprobe terminal 1A (Green wire) at brakelight switch harness connector. If battery voltage exists, replace brakelight switch. If battery voltage does not exist, repair open in Green wire between instrument panel fuse box and brakelight switch.
5. Access cruise control module, located behind right kick panel. Depress and hold brake pedal. Using a voltmeter, backprobe terminal "K" (Green/Yellow wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, replace cruise control module. If battery voltage does not exist, repair open in Green wire or Green/Yellow wire between cruise control module and brakelight switch.
6. Access cruise control module, located behind right kick panel. Depress and hold brake pedal. Using a voltmeter, backprobe terminal "K" (Green/Yellow wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, go to next step. If

battery voltage does not exist, repair open in Green wire between cruise control module and brakelight switch.

7. Turn ignition switch and cruise control main switch to ON position. Depress brake pedal. Measure voltage at terminal "M" (Pink wire) at cruise control module harness connector. If voltage exists, replace cruise control module. If no voltage exists, replace brake switch.

CLUTCH SWITCH CIRCUIT

MX-5 Miata

1. Disconnect harness connector from clutch switch. Clutch switch is located on clutch pedal bracket. Measure continuity between clutch switch terminals. With pedal released, continuity should exist. Depress pedal and recheck continuity. Continuity should not exist. If continuity is as specified, go to next step. If continuity is not as specified, replace clutch switch.
2. Disconnect clutch switch harness connector. Check resistance between ground and terminal "B" (Black wire) at clutch switch harness connector. If continuity exists, go to next step. If continuity does not exist, repair open in Black wire between clutch switch and ground.
3. Connect clutch switch harness connector. Turn ignition switch to ON position. Turn cruise control main switch on. Using a voltmeter, backprobe terminal "A" (Brown/White wire) at clutch switch harness connector. If battery voltage does not exist, go to next step. If battery voltage exists, replace cruise control module.
4. Access cruise control module behind right kick panel. Using a voltmeter, backprobe terminal "J" (Brown/White wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage does not exist, replace cruise control module. If battery voltage exists, repair open wiring between cruise control module and clutch switch. See **WIRING DIAGRAMS** .

Protege

1. Disconnect harness connector from clutch switch. Clutch switch is located on clutch pedal bracket. Measure continuity between clutch switch terminals. With pedal released, continuity should exist. Depress pedal and recheck continuity. Continuity should not exist. If continuity is as specified, go to next step. If continuity is not as specified, replace clutch switch.
2. Disconnect clutch switch harness connector. Check resistance between ground and terminal "E" (Black wire) at clutch switch harness connector. If continuity exists, go to next step. If continuity does not exist, repair open in Black wire between clutch switch and ground.
3. Connect clutch switch harness connector. Turn ignition switch to ON position. Turn cruise control main switch on. Using a voltmeter, backprobe terminal "C" (White/Green wire) at clutch switch harness connector. If battery voltage does not

exist, go to next step. If battery voltage exists, replace cruise control module.

4. Access cruise control module behind right kick panel. Using a voltmeter, backprobe terminal "J" (White/Green wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage does not exist, replace cruise control module. If battery voltage exists, repair open wiring between cruise control module and clutch switch. See **WIRING DIAGRAMS** .

CRUISE CONTROL SWITCH CIRCUIT

NOTE: On Protege, cruise control main switch is incorporated into cruise control switch located in steering wheel.

MX-5 Miata

1. Deactivate and remove driver's side air bag. See appropriate AIR BAG RESTRAINT SYSTEMS article. Remove lower steering column cover. Disconnect clockspring harness connector. Test clockspring. See **CLOCKSPRING** under COMPONENT TESTS. If clockspring is okay, go to next step. If clockspring is defective, replace clockspring.
2. Access cruise control module, located behind right kick panel. Disconnect cruise control module harness connector. Measure resistance between ground and terminal "L" (Violet wire) at cruise control module harness connector while depressing SET/COAST switch. See **Fig. 10** . If resistance is about 198 ohms, go to next step. If resistance is not about 198 ohms, go to step 4 .
3. Ensure clockspring harness connector is firmly connected. Turn ignition switch and cruise control main switch to ON position. Using a voltmeter, backprobe terminal AE (Black wire) at clockspring harness connector. See **Fig. 6** . Press SET/COAST switch. If approximately 1.5 volts is not indicated, replace cruise control switch. If approximately 1.5 volts is indicated, replace cruise control module. Retest system operation.
4. Disconnect cruise control module harness connector. Measure resistance between ground and terminal "N" (Red/White wire) at cruise control module harness connector while depressing RESUME/ACCEL switch. If resistance is about 910 ohms, return to step 1 . If resistance is not about 910 ohms, replace cruise control module. Retest system operation.

Protege

1. Deactivate and remove driver's side air bag. See appropriate AIR BAG RESTRAINT SYSTEMS article. Remove lower steering column cover. Disconnect clockspring harness connector. Test clockspring. See **CLOCKSPRING** under COMPONENT TESTS. If clockspring is okay, go to next step. If clockspring is defective, replace clockspring.
2. Access cruise control module, located behind right kick panel. Disconnect cruise

control module harness connector. Measure resistance between ground and terminal "L" (Violet wire) at cruise control module harness connector while depressing SET/COAST switch. See **Fig. 10** . If resistance is about 198 ohms, go to next step. If resistance is not about 198 ohms, go to step 4 .

3. Ensure clockspring harness connector is firmly connected. Turn ignition switch to ON position. Turn cruise control on. Using a voltmeter, backprobe terminal "C" (Blue wire) at clockspring harness connector. Press SET/COAST switch. If approximately 2 volts is not indicated, replace cruise control switch. If approximately 2 volts is indicated, replace cruise control module. Retest system operation.
4. Disconnect cruise control module harness connector. Measure resistance between ground and terminal "L" (Violet wire) at cruise control module harness connector while depressing RESUME/ACCEL switch. If resistance is about 68 ohms, return to step 1 . If resistance is not about 68 ohms, replace cruise control module. Retest system operation.

TRANSMISSION RANGE (TR) SWITCH CIRCUIT

MX-5 Miata

1. Test transmission range switch. See **TRANSMISSION RANGE SWITCH** under COMPONENT TESTS. If TR switch is okay, go to next step. If TR switch is defective, replace and/or adjust TR switch as necessary.
2. Disconnect TR switch harness connector. Check continuity between ground and terminal "C" (Black/Red wire) at TR switch harness connector. See **Fig. 2** . If continuity exists, go to next step. If continuity does not exist, repair open in Black/Red wire between TR switch and ground.
3. Connect TR switch harness connector. Turn ignition switch to ON position. Turn cruise control main switch ON position. Place gear selector in Drive or Reverse. Using a voltmeter, backprobe terminal "D" (Black/Blue wire) at TR switch harness connector. If battery voltage does not exist, go to next step. If battery voltage exists, replace cruise control module.
4. Access cruise control module, behind left kick panel. Ensure ignition switch is in ON position and cruise control main switch is in ON position. Using a voltmeter, backprobe terminal "J" (Violet wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, repair Violet wire between TR switch and cruise control module as necessary. If battery voltage does not exist, replace cruise control module.

Protege

1. Test transmission range switch. See **TRANSMISSION RANGE SWITCH** under COMPONENT TESTS. If TR switch is okay, go to next step. If TR switch is defective, replace and/or adjust TR switch as necessary.
2. Disconnect TR switch harness connector. Check continuity between ground and terminal "B" (Black/Yellow wire) at TR switch harness connector. See **Fig. 2** . If

continuity exists, go to next step. If continuity does not exist, repair open in Black/Yellow wire between TR switch and ground.

3. Connect TR switch harness connector. Turn ignition switch to ON position. Turn cruise control main switch to ON position. Place gear selector in Drive or Reverse. Using a voltmeter, backprobe terminal "H" (Black/Blue wire) at TR switch harness connector. If battery voltage does not exist, go to next step. If battery voltage exists, replace cruise control module.
4. Access cruise control module, behind right kick panel. Ensure ignition switch is in ON position and cruise control main switch is on. Using a voltmeter, backprobe terminal "J" (Black/Blue wire) at cruise control module harness connector. See **Fig. 10** . If battery voltage exists, repair open in Black/Blue wire between TR switch and cruise control module. If battery voltage does not exist, replace cruise control module.

VEHICLE SPEED SENSOR CIRCUIT

NOTE: Ensure speedometer cable is operating properly before proceeding with this test.

MX-5 Miata

1. Test vehicle speed sensor. See **VEHICLE SPEED SENSOR** under COMPONENT TESTS. If vehicle speed sensor is okay, go to next step. If vehicle speed sensor is defective, replace speedometer.
2. Remove lower instrument panel cover. Disconnect instrument cluster harness connector. Check for continuity of White/Black wire between cruise control module harness connector terminal "P" and instrument cluster harness connector terminal 2L.
3. Raise and support vehicle so that drive wheels can be rotated. Turn ignition switch to ON position. Turn cruise control main switch to ON position. Using a voltmeter, backprobe instrument cluster harness connector terminal 2L. See **Fig. 12** . While rotating drive wheels, voltage should alternate between zero and 5 volts. If voltage is as specified, replace cruise control module. If voltage is not as specified, replace instrument cluster. See appropriate INSTRUMENT PANELS article.

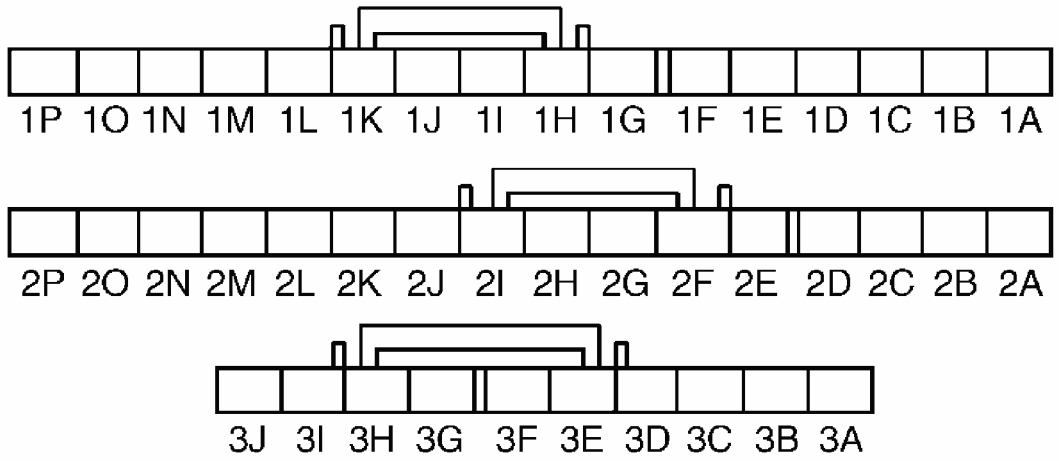

Fig. 12: Instrument Cluster Harness Connector Terminals (MX-5 Miata)
Courtesy of MAZDA MOTORS CORP.

Protege

1. Test vehicle speed sensor. See **VEHICLE SPEED SENSOR** under COMPONENT TESTS. If vehicle speed sensor is okay, go to next step. If vehicle speed sensor is defective, replace speedometer.
2. Remove right side kick panel trim cover. Disconnect cruise control module harness connector. Disconnect instrument cluster harness connector. Check for continuity between cruise control module harness connector terminal "N" (Green/Red wire) and instrument cluster harness connector terminal 3T (White wire). See **Fig. 10** and **Fig. 12** . If continuity exists, go next step. If continuity does not exist, repair wiring as necessary.
3. Access cruise control module, located behind right kick panel. Turn ignition switch to ON position. Turn cruise control switch to ON position. Raise and support vehicle so drive wheels can be rotated. Using a voltmeter, backprobe terminal 3T (White wire) at instrument cluster harness connector. See **Fig. 13** . While rotating drive wheels, voltage should alternate between zero and 5 volts. If voltage is as specified, replace cruise control module. If voltage is not as specified, replace instrument cluster. See appropriate INSTRUMENT PANELS article.

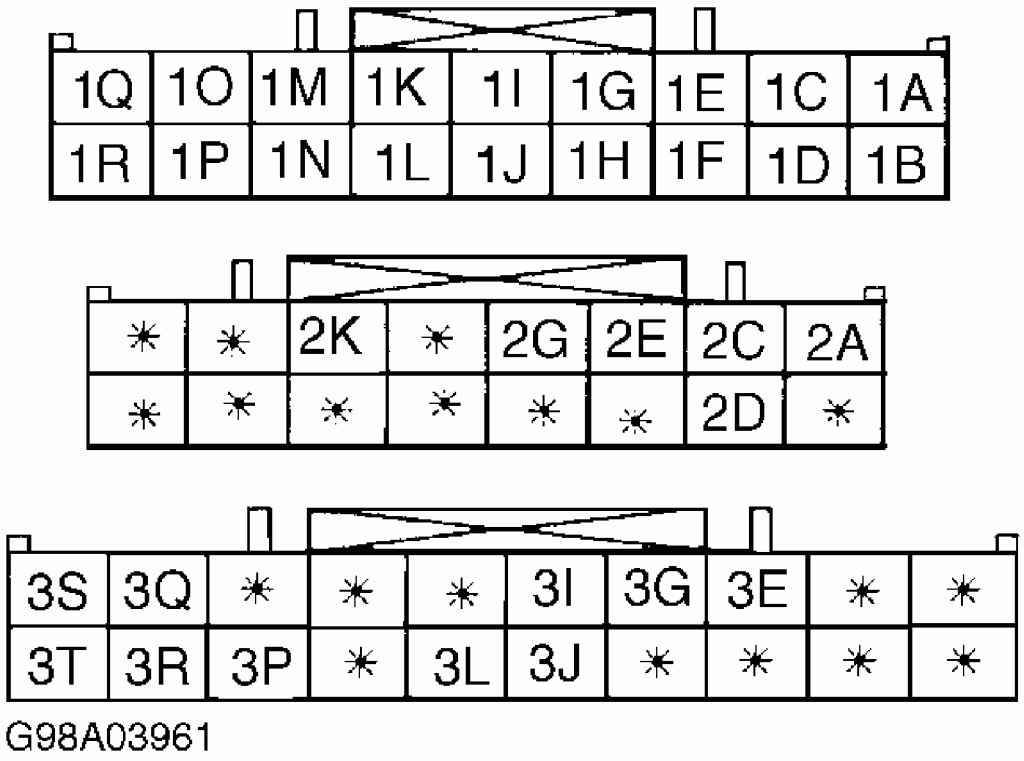

Fig. 13: Instrument Cluster Harness Connector Terminals (Protege)
Courtesy of MAZDA MOTORS CORP.

REMOVAL & INSTALLATION

WARNING: Deactivate air bag system before performing any service operation. See appropriate AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

ACTUATOR

Removal & Installation

Disconnect negative battery cable. Disconnect actuator harness connector. Disconnect actuator cable at actuator. Remove actuator retaining nuts and remove actuator. To install, reverse procedure. Adjust actuator cable as necessary. See **ACTUATOR CABLE** under ADJUSTMENTS.

CRUISE CONTROL MAIN SWITCH

Removal & Installation (MX-5 Miata)

NOTE: Protege cruise control main switch is incorporated with cruise control switch. See CRUISE CONTROL SWITCH .

Disconnect negative battery cable. Remove instrument panel fuse block. Depress locking tabs on cruise control main switch. Pop switch from instrument panel. Disconnect cruise control main switch harness connector and remove switch. To install, reverse removal procedure.

CRUISE CONTROL SWITCH

Removal & Installation (MX-5 Miata)

Cruise control switch is part of multifunction switch. See appropriate STEERING COLUMN SWITCHES article for removal and installation procedures.

Removal & Installation (Protege)

Remove driver's side air bag. See appropriate AIR BAG RESTRAINT SYSTEMS article. Disconnect cruise control switch harness connector. Remove cruise control switch retaining screws. Remove cruise control switch from steering wheel. To install, reverse removal procedure.

WIRING DIAGRAMS

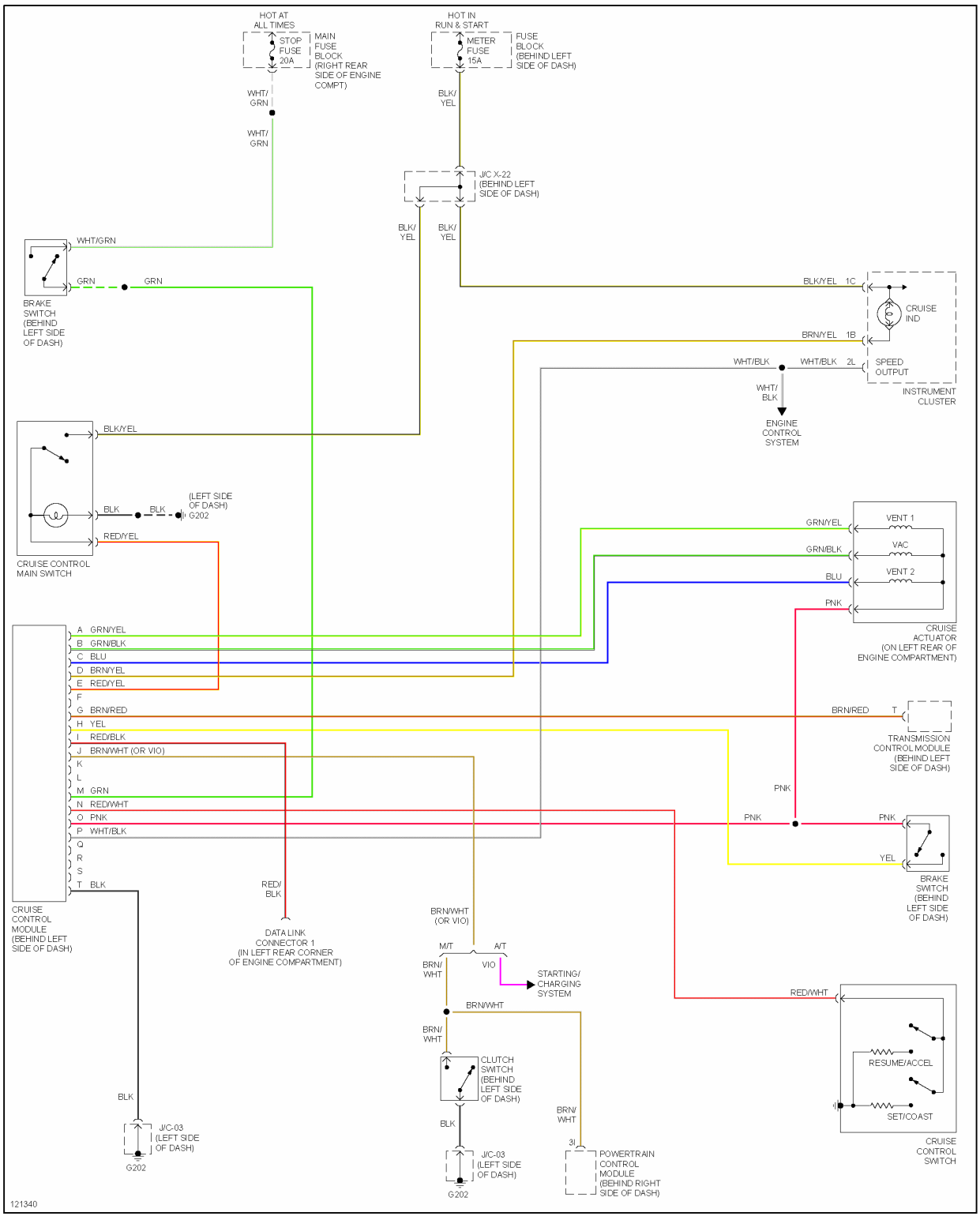

Fig. 14: Cruise Control System Wiring Diagram (MX-5 Miata)

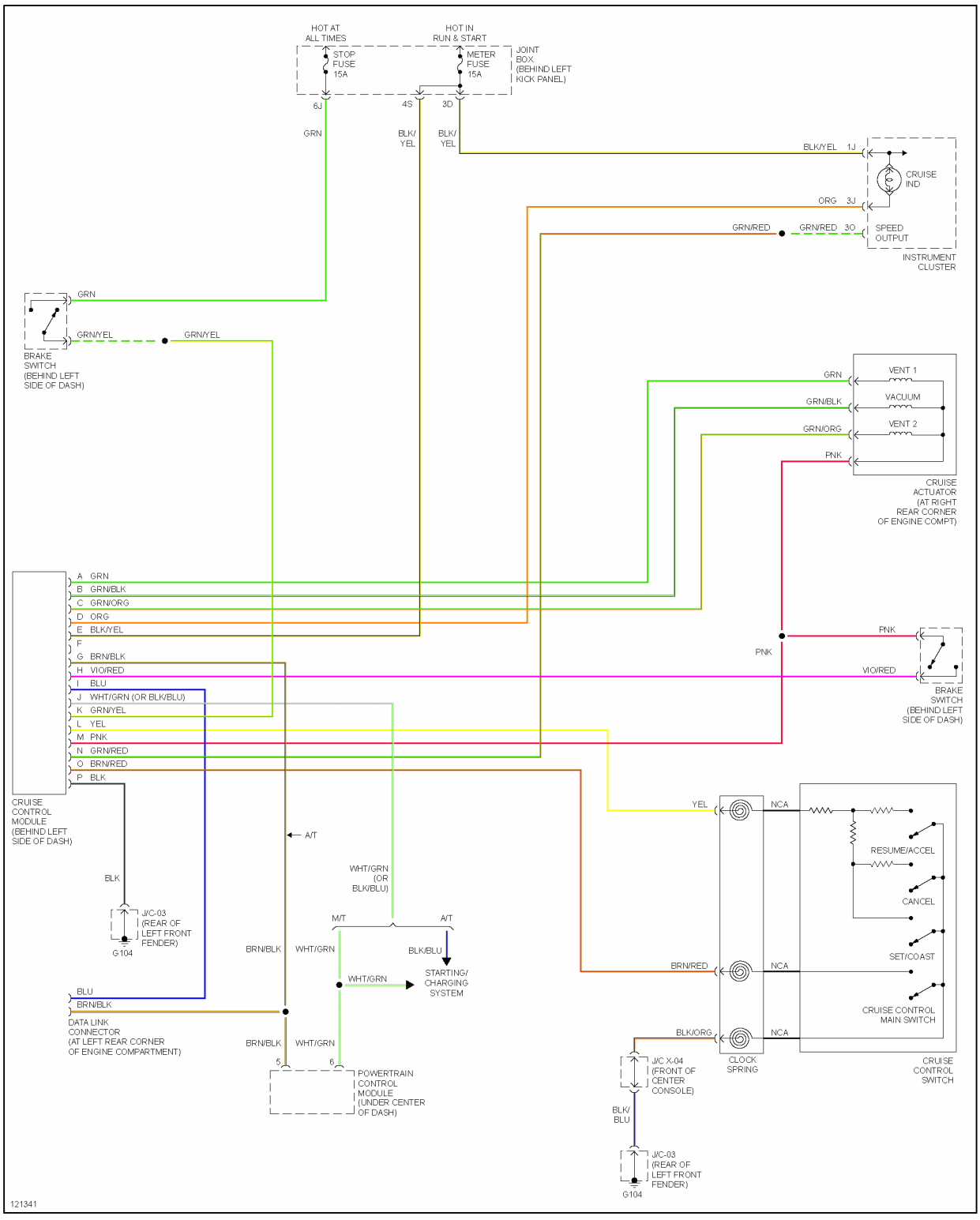

Fig. 15: Cruise Control System Wiring Diagram (Protege)