PACCAR

SERVICE MANUAL

Section	Multiplexed Electrical System Service Manual
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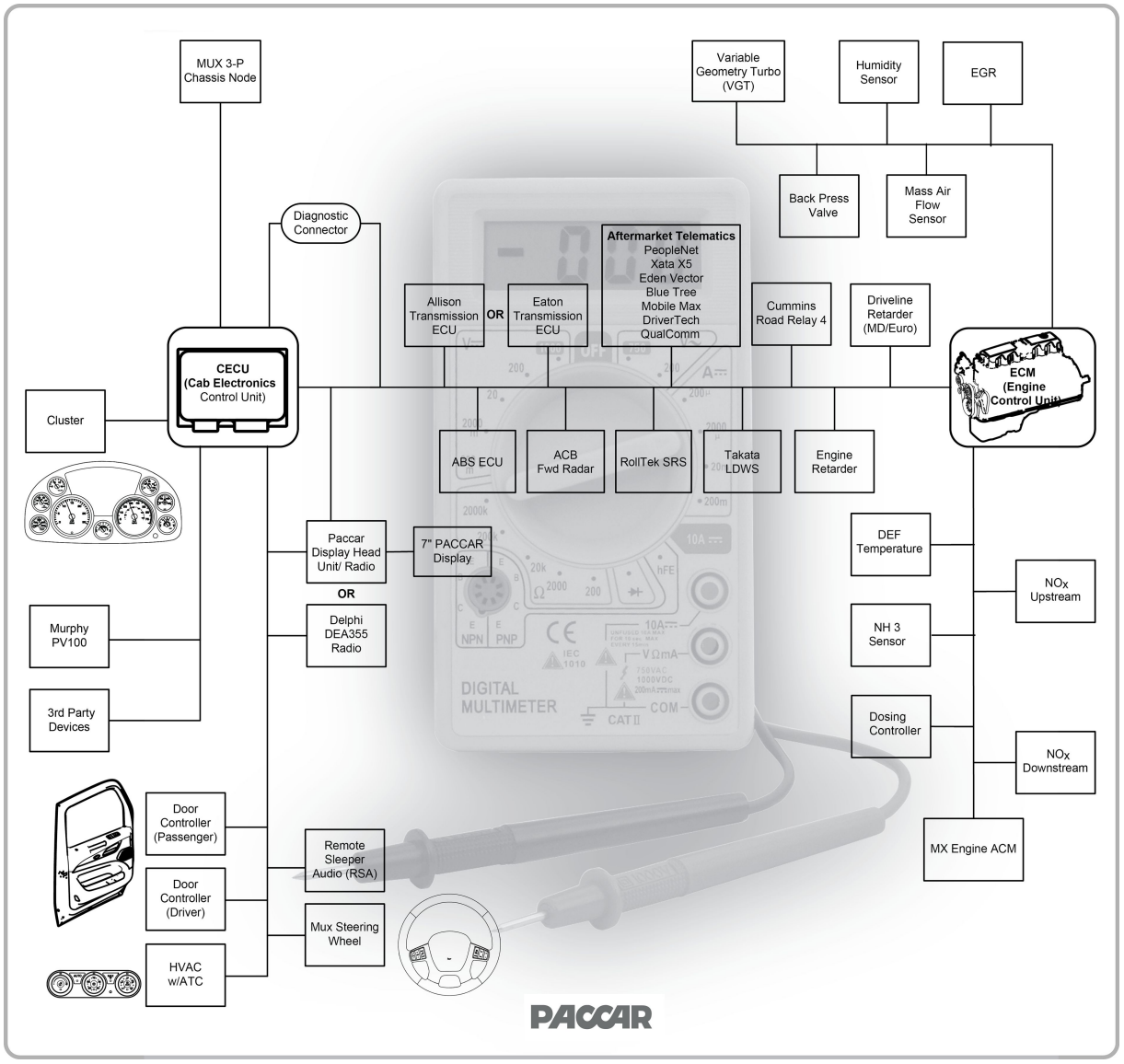
2012 Multiplexed Electrical System Service Manual — (P30-1011)



3 Exploded View

Communication Diagram

Communication diagrams illustrate the signal transmissions between components (switches, sensors, control units, CAN lines, etc.) necessary to perform system functions.

Controller Area Network (CAN) Communication

The following diagram provides an example of the communication lines and signal paths of a typical multiplexed vehicle. Determining the correct communication lines that provide a signal to the CECU and where these circuits interconnect, help pinpoint possible trouble areas. Sometimes these connections become loose, have bent or misaligned pins, and visually inspecting them may help identify why other electrical problems may be occurring.

Network	Description	What's on the Network
V-CAN	Vehicle powertrain	Transmission
		Engine
		ABS
		telematics (optional)[1]
D-CAN	Diagnostic	Diagnostic connector
F-CAN	Frame components	Chassis Node
I-CAN	Instruments	Instrument cluster
C-CAN	Cab	PACCAR Display or Radio
		Door controllers
		HVAC
		Remote Sleeper Audio (optional)
		Multifunction steering wheel (optional)
B-CAN	Body Builder	Aftermarket devices[2]
E-CAN	Engine Input	Turbo
		Humidity Sensor
		EGR
A-CAN[3]	Aftertreatment	NOx sensors
		Doser Control Unit
		Aftertreatment control unit

[1]Not all telematics units will be recognized by the CECU architecture.

[2]Telematic units connected to the BCAN will not be recognized by the CECU. Any device spliced into a CAN wire will not be recognized by the CECU architecture.

[3]For vehicles built with PACCAR MX engine.

7 Specifications

CECU Parameter Part Number	Parameter Description	Min. Value	Max. Value	Explanation
Q30-1024-094	Head Lamp Type	0	40	Parameter controls the PWM activity of the headlamps. Value 0/Single means Single Sealed Beam Value 1/Dual means Dual Sealed Beam Value 2-9/reserved means reserved Value 10/PB means Replaceable Bulb Value 11-19/reserved means reserved Value 20/Integral means Integral Beam Pod Value 21-39/reserved means reserved Value 40/Integral means Integral Beam Pod HID
Q30-1024-095	Starter RPM Protection Enable	0	1	Parameter controls whether the Starter will be disabled when the engine is running. Value 0/Disabled means the engine RPM will be ignored when allowing the starter to engage. Value 1/Enabled means the engine RPM must be below 500 rpm for the starter to engage.
Q30-1024-096	Starter In Gear Protection Enable	0	1	Parameter controls whether the starter will be disabled because of the transmission state. Value 0/Disabled means the starter will be enabled regardless of the transmission state. Value 1/Enabled means the starter will be disabled if the transmission is not in neutral (optional for manual transmissions).
Q30-1024-097	Starter Overcrank Protection Enable	0	1	Parameter controls whether the starter will be disabled due to overuse. Value 0/Disabled means the starter will not be disabled due to overuse Value 1/Enabled means the starter will be disabled if the starter is overused (cranking for 90s without sufficient cooldown).
Q30-1024-099	PACCAR Lighting Model	0	5	Parameter controls the Lighting Model Value 0 = No Exterior Lighting Value 1 = KW BCAB Value 2 = PB BCAB Value 3 = KW NGP Value 4 = PB Value 5 = KW ECE Russian Homologation
Q30-1024-101	Trailer Detect Enable	0	1	Parameter controls the Trailer Detect functionality. Value 0/Disabled means there is no addition diagnostics of the trailer connection. Value 1/Enabled means there is additional diagnostics of the trailer. The operator will be warned if the trailer has become disconnected or is intermittently disconnecting while in motion
Q30-1024-102	Turn Lamps Front Side Installed	0	1	Parameter controls the outputs for the front side turn lamps. Value 0/Disabled means with the hardware installed, the lamps will work, but the diagnostics will not (except short circuits) Value 1/Enabled means the outputs and diagnostics are enabled (mostly for the fender lamps for T660s). If it is enabled with no hardware installed, you will get constant open circuit errors.

Voltmeter Trim Procedure

The voltage gauge reading can be impacted by voltage drop in the wires used to monitor the battery voltage, caused by aging, corrosion, special battery applications, or a needle that is not installed correctly. If the voltage gauge in the vehicle is not reading correctly, use this procedure to adjust the gauge to match the battery voltage measured at the terminals.

When voltage is below 10V or above 15V the gauge telltale will illuminate. There is an inherent 0.3V or less differential between display and DMM reading.

Use the following steps when determining the appropriate parameter values for the Voltage Trim Multiplier and Voltage Trim Offset.

Record measured values in the Voltmeter Trim Values Worksheet. Enter these values into the Voltmeter Trim Calculation formula. See next page for the worksheet and calculation.

1. Set the park brake and turn ignition key to the ON position.
2. Make sure the Voltmeter Trim Offset and Voltmeter Trim Multiplier parameters are set to the default values. Using ESA, select 'Parameters' from the main menu screen, then select 'Standard Gauges', then scroll down to view the Voltmeter Trim Offset and Voltmeter Trim Multiplier. If the values for these parameters are not set at the default values, use ESA to reset the values as follows:
   a. Default Voltmeter Trim Offset = 5,000
   b. Default Voltmeter Trim Multiplier = 100,000

NOTE
To correctly calibrate the voltmeter, both the Voltmeter Trim Offset and Voltmeter Trim Multiplier parameters must be reset to their default values before performing this procedure.

3. Measure the voltage at the batteries. Record the value on the worksheet as “Measured Battery Voltage Engine Off”.
4. Note the displayed voltage using ESA or with the Voltmeter CVSG. Record the value on the worksheet as “Displayed Battery Voltage Engine Off”.
5. Start the Engine.
6. Measure the voltage at the batteries (same place as in step 3). Record the value on the worksheet as “Measured Battery Voltage Engine Running”.
7. Note the displayed voltage using ESA or with the Voltmeter CVSG. Record the value on the worksheet as “Displayed Battery Voltage Engine Running”.
8. Perform the calculations on the worksheet to determine the appropriate values for the Voltage Trim Multiplier and Voltage Trim Offset.
9. Use ESA to set the parameter values to the calculated values.

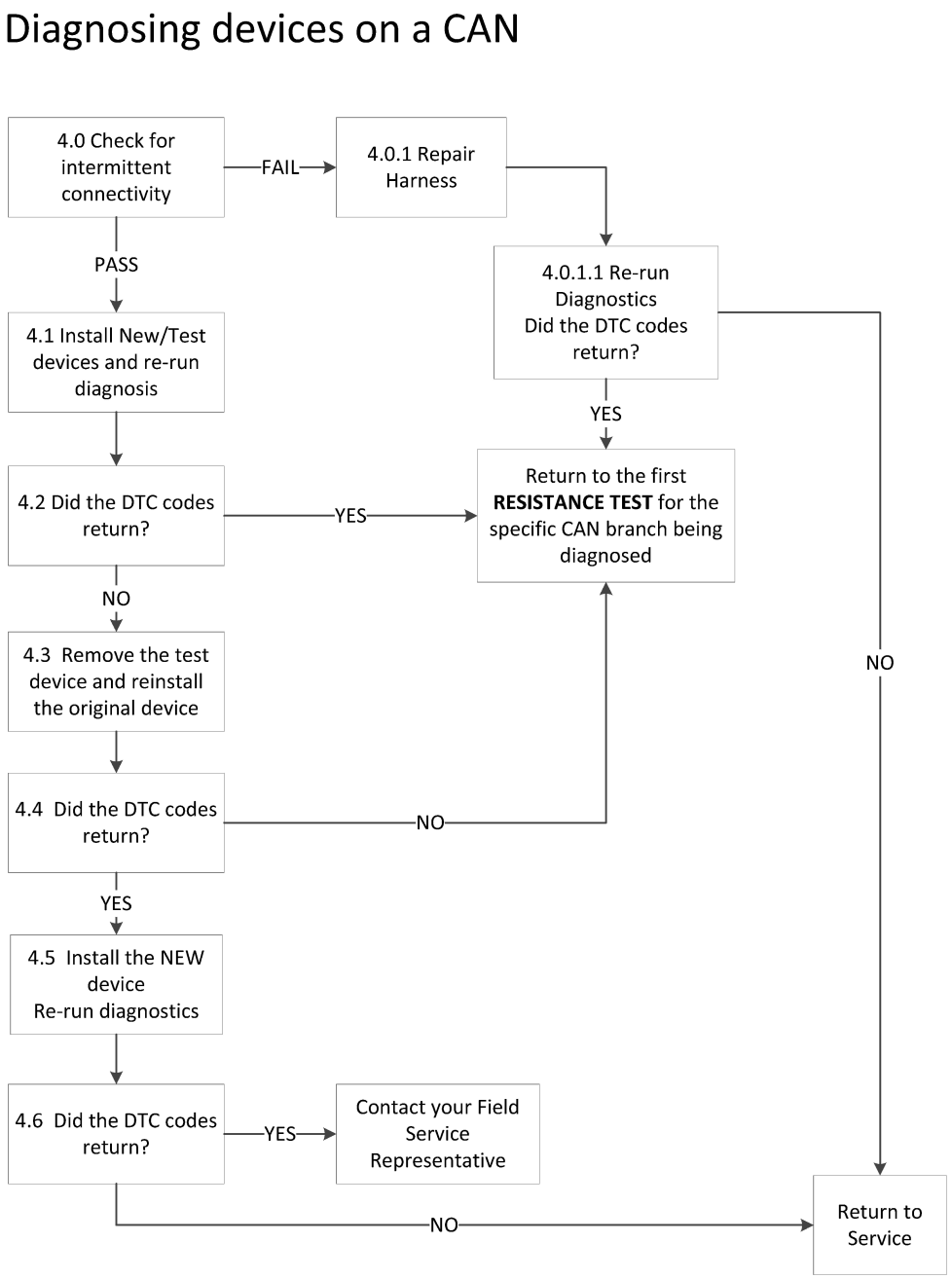
Engine Diagnostic Trouble Codes	
Display Text	**DTC**
Change Engine Oil	1378xx
Engine Oil Level	1380xx
Fuel Filter	1382xx
AUX Temp 1	1385xx
AUX Pressure	1388xx
Pressure Relief Valve	1442xx
ECU Power Relay	1485xx
Injector Boost Voltage	1542xx
Engine Derated	1569xx
Cruise Speed Out of Range	1588xx
Cruise Speed Out of Range	1590xx
Cruise Pause Switch	1633xx
Intake Air Temperature	1636xx
Fan Speed	1639xx
Auto Start Failed	1664xx
Demand Retarder	1715xx
Retarder Selection	1716xx
Catalyst Tank Level	1761xx
Maximum Retarder Speed	1780xx
YC Engine Control	1817xx
YC Brake Control	1819xx
Accel Pedal Position	2623xx
Turbo 1	2629xx
Auxiliary Output 4	2646xx
Auxiliary Output 5	2647xx
EGR Mass Flow	2659xx
Turbo 1 Inlet	2789xx
Turbo 1 Output	2790xx
EGR	2791xx
VGT Position	2795xx
Engine Injector Calibration	2797xx
Air Shutdown Actuator	2813xx
Trans Crank Enable	2900xx
Intake Valve Oil Pressure	2948xx
Intake Valve Oil Pressure	2949xx
Intake Valve Actuator 1	2950xx
Intake Valve Actuator 2	2951xx
Intake Valve Actuator 3	2952xx
Intake Valve Actuator 4	2953xx
Intake Valve Actuator 5	2954xx
Intake Valve Actuator 6	2955xx
Coolant Driver	2988xx
Catalyst Missing	3050xx
EGR Plugged	3058xx
J1939 DPF Monitor	3064xx
Exhaust Gas Temp 1	3241xx
Particulate Trap Inlet Temp 1	3242xx
Exhaust Gas Temp 3	3245xx
Particulate Trap Outlet Temp	3246xx
Exhaust Gas Temp 2	3249xx
Particulate Trap 1 Pressure	3251xx
Particulate Trap 2 Temp	3258xx
Particulate Trap 2 Inlet Temp	3276xx
Particulate Trap 2 Outlet Temp	3280xx
Particulate Trap 2 Pressure	3285xx

Engine Diagnostic Trouble Codes	
Display Text	**DTC**
Catalyst Dosing Unit	3361xx
DPF Fuel Pressure Actuator 1	3471xx
DPF Air Pressure Actuator 1	3472xx
DPF Ignition Failure	3473xx
DPF Ignition Loss	3474xx
DPF Fuel Pressure Control	3479xx
DPF Fuel Pressure Voltage	3480xx
Regen Fuel Rate	3481xx
DPF Fuel Enable Actuator	3482xx
DPF Ignition Current	3484xx
DPF Purge Air Pressure	3486xx
DPF Air Pressure Control	3487xx
DPF Purge Air Actuator	3490xx
DPF Fuel Pressure	3494xx
Sensor Supply Voltage 1	3509xx
Sensor Supply Voltage 2	3510xx
Sensor Supply Voltage 3	3511xx
Sensor Supply Voltage 4	3512xx
Sensor Supply Voltage 5	3513xx
Regen Manually Disabled	3530xx
Ambient Air Density	3555xx
DPF Fuel Injector 1 No Response	3556xx
ECU Power Output	3598xx
Engine Injector 1 Actuator 2	3659xx
Engine Injector 2 Actuator 2	3660xx
Engine Injector 3 Actuator 2	3661xx
Engine Injector 4 Actuator 2	3662xx
Engine Injector 5 Actuator 2	3663xx
Engine Injector 6 Actuator 2	3664xx
Particulate Trap Regen Inhibit Switch	3695xx
Particulate Trap Regen Force Switch	3696xx
Active Regen Switched Off	3703xx
Particulate Trap Regen Inhibited	3711xx
Particulate Trap Soot Load Percent	3719xx
Part Trap 1 Regen Not Available	3750xx
DPF Secondary Air Diff Pressure	3830xx
DPF Secondary Air Mass Flow	3832xx
NOx Limit Exceed Due to Quality	4094xx
NOx Limit Exceed Due to Quantity	4096xx
NOx Limit Exceed Due to Quality	4094xx
NOx Limit Exceed Due to Quantity	4096xx
DPF Fuel Drain Voltage	4097xx
Aftertreatment DEF Tank Low Level Indicator	5245xx
Aftertreatment SCR Operator Inducement Severity	5246xx
Electronic Trans Control 1	61442xx
Electronic Trans Control 2	61445xx
SWD Derate Lamp Data	65519xx
EXT PWM PCAC	65520xx
J1939CM DPF State	65521xx
J1939CM DPF Shutdown	65522xx
EXT PWM Back Pressure	65523xx
J1939CM DPF Post Filter	65524xx
J1939CM DPF Fail WO Engine	65525xx

DTC	Input Received By	Item / System	Description	Detailed Description
8409	CECU	Wheel-Based Vehicle Speed Message	Wheel based vehicle speed message missing	This DTC will be recorded when the control unit does not see the Wheel Based Vehicle Speed message from the engine, or when the message has timed out. Some possible causes for this include faulty wiring to the engine controller, incorrect engine programming or a faulty engine controller.
9003	Chassis Node	PTO Oil Temp	Open in PTO oil temp circuit	This DTC will be recorded when the control unit sees an open at the PTO oil temperature sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.
9004	Chassis Node	PTO Oil Temp	Short in PTO oil temp circuit	This DTC will be recorded when the control unit sees a short to ground at the PTO oil temperature sensor input. Some possible causes for this are a pinched wire, water in a connector, or sensor failure.
9109	CECU	Accelerator Pedal Position Message	Accelerator pedal position message missing	This DTC will be recorded when the control unit does not see the Accelerator Pedal Position Speed message from the engine, or when the message has timed out. Some possible causes for this include faulty data link wiring to the engine controller, incorrect engine programming or a faulty engine controller.
10703	CECU	Air Filter Restriction	Open in air filter restriction circuit	This DTC will be recorded when the control unit sees an open at the air filter restriction sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.
10704	CECU	Air Filter Restriction	Short in air filter restriction circuit	This DTC will be recorded when the control unit sees a short to +5V at the air filter restriction sensor input. Some possible causes for this are a pinched wire, water in a connector, or sensor failure.
11603	CECU	Application Air Pressure	Open in application air pressure circuit	This DTC will be recorded when the control unit sees an open or short to ground at the tractor brake application air pressure sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.
11604	CECU	Application Air Pressure	Short in application air pressure circuit	This DTC will be recorded when the control unit sees a short to +5V at the tractor brake application air pressure sensor input. Some possible causes for this are a pinched wire, water in a connector, or sensor failure.
11703	CECU	Primary Air Pressure	Open in primary air pressure circuit	This DTC will be recorded when the control unit sees an open or short to ground at the primary air pressure sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.
11704	CECU	Primary Air Pressure	Short in primary air pressure circuit	This DTC will be recorded when the control unit sees a short to +5V at the primary air pressure sensor input. Some possible causes for this are a pinched wire, water in a connector, or sensor failure.
11803	CECU	Secondary Air Pressure	Open in secondary air pressure circuit	This DTC will be recorded when the control unit sees an open or short to ground at the secondary air pressure sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.

DTC	Input Received By	Item / System	Description	Detailed Description
239601	Chassis Node	Exterior Lighting - Left Turn Trailer Lamp	Left trailer turn output general error	This set of DTCs will be recorded when there is a problem with one of the Left Turn Trailer Lamp circuit. This could be caused by failed bulbs, wiring harness issues, or corroded connectors. Left turn trailer output from Pin 16 of the Chassis Node connector B.
239603			Left trailer turn output short to power	
239605			Left trailer turn output under current or open circuit	
239606			Left trailer turn output over current	
239613			Left trailer turn output general error	
239631			Left trailer turn output not available	
239801	CECU	Exterior Lighting - Right Turn Trailer Lamp	Right trailer turn output general error	This set of DTCs will be recorded when there is a problem with one of the Right Turn Trailer Lamp circuit. This could be caused by failed bulbs, wiring harness issues, or corroded connectors. Right turn trailer output from Pin 20 of the Chassis Node connector C.
239803			Right trailer turn output short to power	
239805			Right trailer turn output under current or open circuit	
239806			Right trailer turn output over current	
239813			Right trailer turn output general error	
239831			Right trailer turn output not available	
240401	CECU	Park Lamps	Park lamp general error	This set of DTCs will be recorded when there is a wiring problem between the Power distribution center and the CECU connector E pin 7.
240403			Park lamp short to power	
240405			Park lamp open circuit	
240406			Park lamp short to ground	
240413			Park lamp bad reference voltage	
240431			Park lamp chassis node lathches fault	
257903	CECU	Battery Current	Open in ammeter sensor circuit	This DTC will be recorded when the control unit sees an open at the ammeter sensor input. Some possible causes for this are a broken wire, corroded or disconnected connector, or sensor failure.
257904	CECU	Battery Current	Short in ammeter sensor circuit	This DTC will be recorded when the control unit sees a short at the ammeter sensor input. Some possible causes for this are pinched wire, water in a connector, or sensor failure.
265106		Dome Lamp	Dome lamp over current	This DTC will be recorded when the control unit sees overcurrent on the dome lamp output circuit. Some possible cause for this are a short to ground in the circuit, a pinched wire or the wattage of the bulbs on in the circuit are exceeding the output capacity.
286302		Wiper	Invalid range high speed wiper switch input	This DTC will be recorded when the control unit sees an invalid voltage range on the high speed wiper switch input. Some possible causes are broken wire, corroded or disconnected connector or faulty turn stalk switch.
286303		Wiper	Open in wiper relay output	This DTC will be recorded when the control unit sees an open at the wiper output relay. Some possible causes for this are a broken wire, corroded or disconnected connector.

Diagnosing Devices on a CAN Line



Diagnosing the ACAN

(Vehicles with PACCAR MX engine)