

Jeep XJ 4.0L — OBD-II / JTEC Wiring Diagnostic Quick Reference

1996–2001 OBD-II MPI • JTEC (Jeep Truck Engine Controller) PCM • Stores P-code DTCs, has MIL. Document 3 of 3 (companions: 1987–1990 Renix and 1991–1995 OBD-I references). Wire colors reflect an XJ harness circa 1997 — see Section 7 for year/model variations.

1. System Overview

Item	Detail
Controller	JTEC PCM, on firewall (passenger side)
Connectors	Three 32-pin Micro-Pack: C1 Black, C2 White, C3 Gray
Diagnostics	Full OBD-II. P-code DTCs + MIL. Read via any OBD-II scanner on the DLC, or key-cycle (ON-OFF-ON-OFF-ON within 5s; codes on odometer, ends "done"/55)
Ignition	Single canister coil + distributor (CMP sync inside distributor). The XJ 4.0L retains a distributor through 2001 — it is NOT a waste-spark / coil-on-plug system (coil-on-plug came to the TJ Wrangler after 1997).
Idle control	IAC (Idle Air Control) stepper motor, 4-wire, on throttle body
CKP	3-wire Hall-effect on bellhousing, 5.0V supply (digital 0/5V signal)
Main power relay	ASD (Automatic Shutdown) relay — PCM controls ground side
Fuel pump	Full 12V; PCM grounds fuel pump relay independently of ASD
Charging	PCM-controlled alternator field (PWM)
5V reference	Two separate supplies: K7 primary, K6 secondary

Golden rule: read codes first, but a code identifies the **circuit** with a fault — not necessarily the failed part. Verify power, ground, and signal at the sensor before replacing it. (1991–1995 OBD-I is a different controller/code set — see the companion OBD-I document.)

2. Sensor Specs & Expected Readings ~1997 XJ colors

Crankshaft Position (CKP) — 3-wire Hall

Type	Hall-effect (digital)
PCM pins	A8 signal (K24 GY/BK), 5V A17, gnd A4
Supply	5.0V reference
Signal KOEO	~5V (pulled high)
Signal cranking	0–5V square wave
Test	No resistance test (Hall) — crank by hand, watch DC volts toggle
Codes / fail	P0320, P0336, P1391; thermal failure (hot no-start)

TPS & MAP

TPS pins	A23 5V (K22 OR/DB), A15 sig (K21 BK/RD), A4 gnd
TPS closed	~0.5V WOT ~4.5V
TPS codes	P0121, P0122, P0123
MAP pins	B31 5V (K6 VT/OR), A27 sig (K1 DG/RD), A4 gnd
MAP conn.	1=gnd, 2=sig, 3=5V
MAP KOEO	~4.8V (atmos)
MAP w/ vac	5"=3.9V, 10"=3.1V, 15"=2.1V
MAP codes	P0106, P0107, P0108

Camshaft Position (CMP) — in distributor

PCM pin	A18 signal (K44 TN/YL), shared 5V + gnd
Signal	0–5V square wave running
Codes	P0340, P0341, P1391. Cam/crank relearn after replace

Coolant (ECT) & Intake Air (IAT) — NTC thermistor (same curve)

Temp	-40°F	32°F	70°F	100°F	160°F	200°F	212°F
Resistance	~100kΩ	~7,500Ω	~3,400Ω	~1,600Ω	~450Ω	~250Ω	~185Ω
Approx volts	~4.9V	~3.5V	~2.8V	~2.0V	~1.0V	~0.6V	~0.5V

IAT = PCM A16 (K2 TN/BK); **ECT** via separate circuit. (On 1996–1998 Grand Cherokee the labels swap: A15=IAT BLK/RED, A16=ECT TAN/BLK — see Section 7.)
Open → reads -40°F, rich. **Short** → reads hot, lean. Gauge sender is separate.

Oxygen Sensors (upstream + downstream)

Param	Upstream O2S11	Down O2S12
PCM pin	A24 (K41 BK/DG)	A25 (K141 TN/WT)
Rich	0.5–1.0V	~0.4–0.6V steady
Lean	0.05–0.5V	—
Switch	Several / sec	Slow / steady
Codes	P0131, P0133	P0137, P0139

4-wire (2 heater + signal + ground); ASD relay powers heaters. OBD-II adds the downstream (post-cat) sensor.

Injectors & Ignition Coil corrected

Inj. resist.	10.8–13.2 Ω
Inj. feed	12V from ASD relay
Inj. PCM pins	B4 c1, B15 c2, B5 c3, B16 c4, B6 c5, B12 c6
Inj. codes	P0201–P0206
Coil type	Single canister coil w/ distributor (lower front, passenger side of block)
Coil primary	0.95–1.20 Ω (across harness-plug posts)
Coil secondary	11,300–15,300 Ω (tower to a primary pin)
Coil feed	White wire = 12V (from ASD); Green wire = PCM signal (driver A7, K19 GY)

Ignition correction vs. waste-spark systems: the XJ 4.0L has **one** coil firing through a distributor, so there are no "coil pairs." A failed coil = no spark to **all** cylinders. Multi-coil codes **P0352 / P0353 do not apply**; a single-coil primary-circuit fault may set P0351. A misfire on one cylinder (P0301–P0306) points to that cylinder's plug, plug wire, distributor cap/rotor, injector, or compression — not a coil.

Spark test: pull coil wire from distributor, insert a spare plug, ground it, crank — strong blue spark = coil + trigger OK. **Injector test:** unplug, ohm across terminals; all 6 within ~1Ω; OL/0Ω = replace.

3. PCM Pinout (JTEC, 1996–2001) — 33 active of 96

C1 — BLACK (18 active)

Pin	Ckt	Wire	Function
A2	—	ORG	Ignition power
A4	K167	BR/YL	Sensor ground
A7	K19	GY	Coil driver
A8	K24	GY/BK	CKP signal
A10	K60	YL/BK	IAC motor #2
A11	K39	GY/RD	IAC motor #1
A15	K21	BK/RD	TPS signal
A16	K2	TN/BK	IAT signal
A17	K7	OR	5V ref (primary)
A18	K44	TN/YL	CMP signal
A19	K59	VT/BK	IAC motor #4
A20	K40	BR/WT	IAC motor #3
A22	—	RD/YL	Fused B+ (constant)
A23	K22	OR/DB	TPS 5V supply
A24	K41	BK/DG	Upstream O2 signal
A25	K141	TN/WT	Downstream O2 signal
A27	K1	DG/RD	MAP signal
A31/32	Z12	BK/TN	PCM Ground #1 / #2

C2 — WHITE (10 active)

Pin	Ckt	Wire	Function
B4	K11	WT/DB	Injector #1
B5	K15	PK/BK	Injector #3
B6	K12	TN	Injector #5
B10	K20	DG	Generator field ctrl
B12	K16	LG/BK	Injector #6
B15	K13	YL/WT	Injector #2
B16	K14	LB/BR	Injector #4
B23	G60	GY/YL	Oil pressure sense
B27	G7	WT/OR	Vehicle speed sensor
B31	K6	VT/OR	MAP 5V reference

C3 — GRAY (5 active)

Pin	Ckt	Wire	Function
C15	K118	PK/YL	Battery temp sensor
C19	K31	BR	Fuel pump relay ctrl
C20	K52	PK/BK	EVAP canister ctrl
C25	K72	DG/OR	Generator source sense
C--	K51	DB/YL	ASD relay control

5V reference: K7 (A17) feeds CKP, CMP, TPS. K6 (B31) feeds MAP. K22 (A23) dedicated TPS. A short to ground on ANY sensor sharing a 5V bus pulls down ALL on that bus → no-start. Unplug sensors one at a time; 5V returns when the shorted one is removed. (Codes P1295/96 = no 5V to TPS/MAP; P1496 = 5V too low.)

4. Relays (Bosch pinout: 85/86 coil, 30 common, 87 NO out)

Relay	Pin 30	Pin 85	Pin 86	Pin 87 out
ASD	Always hot from PDC	12V from ign fuse F11	Gnd from PCM (K51 DB/YL)	Coil, injectors, O2 heaters
Fuel Pump	Gnd controlled by PCM C3-C19 (K31 BR), independent of ASD			

ASD logic: key RUN → PCM grounds pin 86 ~2s; stays energized if CKP seen during cranking; drops out instantly on lost CKP/CMP or out-of-range voltage (engine dies).
Bench: coil 85–86 = 50–120Ω; 12V to 85/86 → click → 30–87 ~0Ω. **In-circuit:** backprobe pin 86 for momentary ground during 2-3s prime.

ASD relay: both diode-suppressed and resistor-suppressed types were used. Wrong type can damage the PCM. Never swap unless part numbers match exactly.

5. OBD-II Trouble Codes (1996–2001 JTEC) — Quick List

Read via key-cycle (ON-OFF-ON-OFF-ON within 5s, codes on odometer, ends "done"/55) or scanner on the DLC under the driver dash. A code names the circuit, not the part — verify power/ground/signal first.

Fuel & Air (P01xx)

Code	Meaning / first checks
P0131/32	Upstream O2 low/high V
P0133/34	Upstream O2 slow / no activity
P0135	Upstream O2 heater (5-7Ω, ASD feed)
P0137/38/39	Downstream O2 low/high/slow
P0141	Downstream O2 heater circuit
P0171/72	System lean/rich Bank 1
P0106	MAP performance (vs TPS)
P0107/08	MAP low/high V (lost K6 5V / open)
P0121	TPS/MAP disagreement
P0122/23	TPS low/high V
P0112/13	IAT low/high V
P0117/18	ECT low/high V (gauge sender separate)

P0174/75 (Bank 2) N/A — 4.0L single-bank.

Emissions (P04xx)

Code	Meaning
P0401/03/04	EGR low flow / solenoid / performance
P0440/41/42	EVAP general / purge flow / small leak
P0443	EVAP purge solenoid circuit
P0455	EVAP large leak (gas cap, big hose)
P0420	Catalyst efficiency — verify O2 first

Speed & Idle (P05xx)

Code	Meaning
P0500/01	VSS circuit / performance (C2-B27 G7)
P0505	Idle control (clean IAC, vac leak)
P0506/07	Idle lower / higher than expected

Transmission (AW4): auto = Aisin-Warner AW4 with its own TCM (behind R kick panel), not the PCM. TCM fault → PCM stores **P0700** (MIL request); read underlying code with a TCM-capable tool. Codes incl. P0711/12/13 (TFT), P0720 (output speed), P0731–34 (gear ratio), P0740/43 (TCC), P1899 (P/N switch). Manual builds set none. **Bus:** Chrysler PCI (SAE J1850)+SCI — predates generic U0xxx (CAN).

Injectors / Misfire / Ignition (P02–P03xx)

Code	Meaning / first checks
P0201–06	Injector cyl 1–6 (driver, 10.8-13.2Ω, ASD feed)
P0320	No crank reference (CKP thermal, 5V/gnd/sig)
P0335/36	CKP circuit / range (wiring, tone ring)
P0340/41	No cam signal / CMP range (distributor)
P0300	Random misfire (vac, fuel, cap/rotor, coil)
P0301–06	Misfire cyl 1–6 (plug/wire, cap/rotor, injector, compression)
P0351	Ignition coil primary circuit (single coil; 0.95-1.20Ω, driver A7)
P0325	Knock sensor 1 circuit

P0352/P0353 do NOT apply (single coil + distributor, no coil rail).

Computer & Output (P06xx)

Code	Meaning
P0600	Serial comm link (check PCM power/gnd)
P0601/02	PCM memory / programming error
P0622	Generator field ctrl (legacy Code 41)
P0645	A/C clutch relay circuit

Chrysler-Specific (P1xxx)

Code	Meaning / first checks
P1281	Engine cold too long (thermostat / ECT)
P1282	Fuel pump relay control (C3-C19 K31)
P1294	Target idle not reached (vac, IAC)
P1295/96	No 5V to TPS (K22) / MAP (K6)
P1297	No MAP change start → run
P1391	Intermittent CKP/CMP loss (thermal CKP, connector)
P1398	Misfire adaptive at limit (tone ring)
P1492/93	Batt/ambient temp sensor V high/low
P1494/95	Leak detection pump switch / solenoid
P1496	5V supply too low (shared ref down)
P1684	Battery disconnected <50 starts (info)
P1696/97	PCM EEPROM / SRI memory fault
P1698	No bus message from TCM

6. Troubleshooting Decision Trees

Crank—No-Start (JTEC / OBD-II)

ENGINE CRANKS BUT WON'T START (1996-2001 JTEC)	
Read DTCs first (key-cycle or scanner)	
ASD click + fuel pump prime at key-ON?	
YES → check CKP (P0320?), spark at coil wire, injector pulse	
Has codes → follow code-specific path	
No codes → check 5V ref (unplug sensors one at a time)	
NO → check PCM power (C1-A22 fused B+), grounds (A31/A32)	
Power/gnd OK → check ASD wiring, K51 control wire	
No power/gnd → trace fuse, fusible link, ground wires	
Common: CKP thermal failure (hot no-start) – let cool, retry	
No spark to ALL cylinders → suspect single coil, coil driver (A7), or ASD feed	
Spark on some cylinders only → distributor cap/rotor, plug wires	

Rough Idle

ENGINE IDLES ROUGH	
Vacuum leak (spray test)?	
Found → repair hose / intake / TB	
None found	
Clean / check IAC motor	
TPS volts at idle	
Out of spec → replace	
In spec → continue	
MAP at idle (~1.5-2.0V)	
Fouled injector (balance test)	
Cap/rotor, plug wires	
ECT reading (wrong = wrong mix)	
O2 activity (stuck rich/lean?)	

Charging System

BATTERY NOT CHARGING / LOW V	
Running V at batt = 13.8-14.4V?	
Low/none	
Ground-field test: unplug field, jumper terminal to ground	
Charges → alt OK; PCM driver/wiring. Check B10(K20), C25(K72). Replace PCM or add external regulator	
No charge → alt internal	
Check belt tension & connections	
Overcharge >15V → PCM field stuck on	

Universal Sensor Circuit Diagnosis

SENSOR READING SUSPICIOUS	
5V reference at sensor connector (key ON)?	
0V → open wire or PCM internal fault	
Low 1-3V → short to ground on shared 5V bus → unplug sensors one at a time; 5V returns → last unplugged is shorted	
4.8-5.2V → reference OK, continue	
Sensor ground at connector? >0.5Ω to batt neg → bad ground, repair	
Signal voltage? Stuck 5V=open · Stuck 0V=short · erratic=intermittent (wiggle) · in range → look elsewhere	

7. Wiring Color Variations by Year & Model

The most important wiring rule: the circuits stay constant but wire colors are NOT identical across years or models. If the colors at your connector don't match a chart, do **not** use that chart — identify the terminal by **connector orientation / position**. The colors in Sections 2–3 are one XJ snapshot (~1997).

7.1 Crankshaft Position (CKP) circuit — verified by model/year

Year / model	Signal	Ground	Supply (V)
1994–1995 Grand Cherokee 4.0L (OBD-I)	RED/LT GRN	BLK/LT BLU	WHT/BLK (8V)
1996 Grand Cherokee 4.0L (OBD-II)	RED/LT GRN	BLK/LT BLU	WHT/BLK (5V)
1994–1995 Wrangler 4.0L (OBD-I)	GRY/BLK	BLK/LT BLU	ORG (8V)
~1997 XJ Cherokee (this doc's data)	GY/BK (K24)	shared A4 BR/YL	OR / K7 (5V)

Note: the CKP supply **dropped from 8V (1991–1995) to 5V (1996+)** at the OBD-II change, and the same signal wire is RED/LT GRN on a Grand Cherokee but GRY/BLK on a Wrangler. **Connector style:** round plug 1991–1992, flat plug 1993+.

7.2 PCM black-connector key circuits — XJ vs Grand Cherokee differ (both OBD-II)

Pin	Function	~1997 XJ (this doc)	1996–1998 Grand Cherokee
A4	Sensor ground	BR/YL	BLK/LT BLU
A7	Coil driver	GY	GRY/WHT
A8	CKP signal	GY/BK	RED/LT GRN
A17	5V supply	OR	WHT/BLK
A18	CMP signal	TN/YL	GRY/BLK
A23	TPS signal/supply	OR/DB	ORG/DK BLU (same)
A24	Upstream O2	BK/DG	BLK/ORG
A27	MAP signal	DG/RD	RED/WHT
A15 / A16	Pin assignment	A15=TPS, A16=IAT	A15=IAT, A16=ECT

Coverage & confidence. CKP and Grand Cherokee pinout colors are verified against published service data (TroubleshootMyVehicle, from Chrysler FSMs). A fully verified, circuit-by-circuit color matrix for every XJ year is not cleanly published — much is model-specific (XJ vs ZJ/WJ vs TJ) and lives only in each year's FSM 8W section. For your exact vehicle, the FSM 8W is the authority. Colors shown without a year = ~1997 XJ.

8. Procedures & Wire Color Code Legend

Key DMM procedures

- **Voltage:** DC 20V; black to good ground, red to pin; backprobe live circuits.
- **Resistance:** power OFF, disconnected. OL=open, 0Ω=short. (Hall CKP/CMP can't be ohm-tested — use DC volts.)
- **Continuity:** good wire beeps, ≤0.3Ω.
- **Voltage drop (ground):** red to ground point, black to batt neg, load circuit. <0.1V good; >0.2V = repair.
- **Backprobe** from wire side, or wire-piercing probe a few inches from the connector. Never probe the connector front.

Wire color codes

Code	Color	Code	Color
BK	Black	OR	Orange
BL	Blue	PK	Pink
BR	Brown	RD	Red
DB	Dark Blue	TN	Tan
DG	Dark Green	VT	Violet
GY	Gray	WT	White
LB	Lt Blue	YL	Yellow
LG	Lt Green	GN	Green

BK/RD = base/stripe. Charts may abbreviate (GY) or spell out (GRY, DK BLU). Verify by connector position when colors disagree.

OBD-II / JTEC (1996–2001) quick reference, Document 3 of 3. Specs reflect ~1997 XJ; verify against your year's FSM 8W. Ignition corrected to single coil + distributor (coil specs per FixJeeps / Chrysler FSM). Sources: Chrysler/Jeep FSM 8W, TroubleshootMyVehicle (PCM pinout & CPS charts), FixJeeps (coil test), jtec.info, NAXJA / Cherokee Forum. For diagnostic guidance only.