

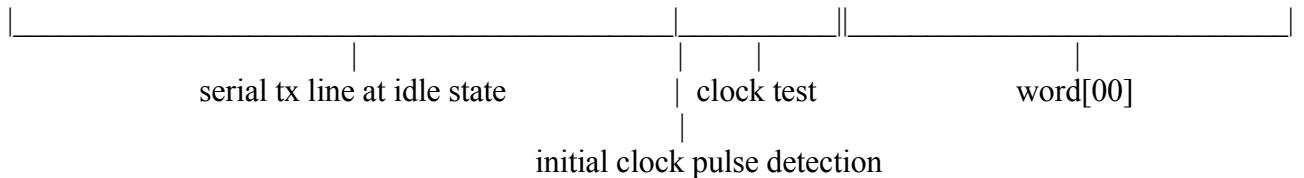
Toyota OBD-I signalling protocol

written by BK (2006 December) for toymods

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bitstream:

<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	
0	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	28	29	30



serial framing: (word[##])

<i>0</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>
0	1	2	3	4	5	6	7	8	9	10
start bit	data.0	data.1	data.2	data.3	data.4	data.5	data.6	data.7	stop bit	stop bit

data layout:

16	4	11	11	11	11	11	11	11	11	11
idle	clock test	word[00]	word[01]	word[02]	word[03]	word[04]	word[05]	word[06]	...	word[12]

NOTES:

- connect TE2 to E1 for data to flow from ENG (DLC2 connector)
- signal time period: $T = 8.192 \text{ mS}$
- dataset length: 163 bits.
- number of words per dataset: 13.
- approximate baudrate: 122 bits/s
- total time per dataset: $\sim 1.3 \text{ seconds}$.
- if line is pulled high for more than 10 bits, consider line idle and disable clocking.
- when line becomes low after idle, (re-)synchronise clock immediately.
- sample data after $T/2$ of clock (re-)sync, at T intervals. (ie: between clock pulses)

<i>word</i>	<i>description</i>	<i>manipulation</i>	<i>units</i>
00	???		
01	IGN: ignition (?!?)	?!?	° CA
02	INJ: injector pulse width (?!?)	?!?	mS
03	IAC: idle air control (ISCV step)		#
04	RPM: engine speed	*25	rev/min
05	MAP: manifold absolute pressure	$X*5/256$ (?!?)	V
06	ECT: engine coolant temperature	$(255-X)*5/256$	V
07	TPS: throttle position sensor	/2	°
08	Speed		
09	???		
10	???		
11.0	Cold Start UP		1=ON
11.1	Warm UP		1=ON
11.2			
11.3			
11.4			
11.5			
11.6			
11.7			
12.0	Start SW		1=ON
12.1	Idle (throttle closed) SW		1=ON
12.2	A/C SW		1=ON
12.3	Neutral SW		1=ON
12.4			
12.5			
12.6			
12.7	Diagnostics condition		1=GOOD

Table: word description

half unknown: INJ, IGN, MAP

unknown: A/F adjustment control, knock sensor, oxygen sensor (rich/lean).

ECT calculation:

<i>Voltage Range</i>	<i>Calculation</i>
3.4V to 4.3V	$T_{ECT} = -20 + (4.3 - V_{ECT}) * 22.22$
2.4V to 3.4V	$T_{ECT} = 0 + (3.4 - V_{ECT}) * 20$
1.5V to 2.4V	$T_{ECT} = 20 + (2.4 - V_{ECT}) * 22.22$
0.9V to 1.5V	$T_{ECT} = 40 + (1.5 - V_{ECT}) * 33.33$
0.5V to 0.9V	$T_{ECT} = 60 + (0.9 - V_{ECT}) * 50$
0.3V to 0.5V	$T_{ECT} = 80 + (0.5 - V_{ECT}) * 100$

Table: ECT calculation