



FUEL INJECTION — ADVANCED CONTROLS

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## SERIAL DATA STREAM PROTOCOL

### SM3 / SM4 / WRX01 / EVO IX v1.09, v1.09\_1 & v1.09\_4 rev 14 May 2018

**BAUD RATE:** 19200 baud

**PROTOCOL:** RS232 Async, 10 bits, comprising 1 start bit, 8 data bits (LSB first) and 1 stop bit .

**UPDATE RATE:** 20Hz

- Notes:**
1. Data uses INTEL byte ordering (low byte first)
  2. Checksum uses MOTOROLA byte ordering (high byte first)  
CHECKSUM (16 bit) = -( DATA LENGTH +  $\sum$  data bytes)
  3. Cal file contains channel selection

BYTE NO.	SIZE	TYPE	DESCRIPTION	SCALING
1	8 bit		PACKET I.D. = 24 hex (36 decimal)	ASCII "\$"
2	8 bit	unsigned	DATA LENGTH = 30 hex (48 decimal)	No. data bytes
3-4	16 bit	signed	BATTERY VOLTAGE	1 count = 0.01 volts
5-6	16 bit	signed	COOLANT TEMP	1 count = 0.1 degC
7-8	16 bit	signed	CHARGE TEMP	1 count = 0.1 degC
9-10	16 bit	signed	INTAKE AIR TEMP	1 count = 0.1 degC
11-12	16 bit	signed	Not available (Always returns 0)	
13-14	16 bit	signed	VEHICLE SPEED	1 count = 0.1 KPH
15-16	16 bit	signed	EXHAUST BACK PRESSURE	1 count = 0.1 kPa ABSOLUTE
17-18	16 bit	signed	MANIFOLD ABS PRESS	1 count = 0.1 kPa ABSOLUTE
19-20	16 bit	signed	THROTTLE POSN	1 count = 0.1%
21-22	16 bit	signed	ENGINE SPEED	1 count = 1 RPM
23-24	16 bit	signed	AF RATIO	1 count = 0.01 A/F
25-26	16 bit	signed	CAM ANGLE 1	1 count = 0.3516 deg
27-28	16 bit	signed	CAM ANGLE 2	1 count = 0.3516 deg
29-30	16 bit	unsigned	ERROR STATUS (INSTANT) bits 0 - 15	1 bit / error type
31-32	16 bit		Undefined	
33-34	16 bit	unsigned	ERROR STATUS (INSTANT) bits 16 - 31	1 bit / error type
35-36	16 bit		Undefined	
37-38	16 bit	unsigned	INJECTION TIME 1	1 count = 0.8 uSEC
39	8 bit	signed	IGNITION ANGLE 1	1 count = 0.5 deg
40	8 bit	signed	IGNITION ANGLE 2	1 count = 0.5 deg
41	8 bit	unsigned	KNOCK MOST RETARDED	1 count = 0.25 deg
42	8 bit		Undefined	
43-44	16 bit	as reqd.	USER SELECTABLE CHANNEL 1 (note 3)	channel selection dependent
45-46	16 bit	as reqd.	USER SELECTABLE CHANNEL 2 (note 3)	channel selection dependent
47-48	16 bit	as reqd.	USER SELECTABLE CHANNEL 3 (note 3)	channel selection dependent
49-50	16 bit	as reqd.	USER SELECTABLE CHANNEL 4 (note 3)	channel selection dependent
51-52	16 bit	unsigned	DATA CHECKSUM (note 2)	

ERROR Bit	DESCRIPTION	NOTES
0	INTAKE TEMPERATURE SENSOR	
1	COOLANT TEMPERATURE SENSOR	
2	THROTTLE SENSOR	
3	MANIFOLD PRESSURE SENSOR	
4	EXHAUST BACKPRESSURE SENSOR	
5	BAROMETRIC PRESSURE SENSOR	
6	AIR FUEL RATIO SENSOR 1	
7	AIR FUEL RATIO SENSOR 2	
8	CYLINDER INPUT MISSING	
9	SYNC INPUT MISSING	
10	TOO FEW CYLINDER PULSES	
11	TOO MANY CYLINDER PULSES	
12	HIGH SPEED INPUT 1 MISSING	For PID control
13	HIGH SPEED INPUT 2 MISSING	For PID control
14	CAM 1 POSITION ERROR	Feedback error
15	CAM 2 POSITION ERROR	Feedback error
16	OVERBOOST ERROR	
17	KNOCK HARDWARE ERROR	Sensor or Control board
18	POWER DOWN ERROR	
19	OVER VOLTAGE ERROR	
20	CMOS RAM MEMORY LOSS	
21	EEROM ERROR	
22	AIR FUEL CLOSED LOOP CONTROL ERROR	
23	KNOCK CONTROL ERROR	Retard limit reached
24	FUEL TEMPERATURE SENSOR	
25	FUEL PRESSURE SENSOR	
26	OIL TEMPERATURE SENSOR	
27	OIL PRESSURE SENSOR	
28	USER CHANNEL 1	
29	USER CHANNEL 2	
30	USER CHANNEL 3	
31	USER CHANNEL 4	