

## Adaptronic Modular CAN Output Configuration

### Basic information

Bit rate            500 kbps  
ECU termination    On  
Identifier format   11-bit  
Base address    S300

- \* All variables are 16-bits, signed, 2s complement
- \* The "scalar" field means "divide the number by this to display it to the user". Eg 1000 means that the value has a resolution of 0.001, and a value of 2500 would be represented to the user as 2.500.
- \* Temperatures are all expressed in Celcius with a scalar of 10. Eg 25 °C would be represented by a value of 250.
- \* Pressures can be gauge, absolute or differential, and are all expressed in kPa with a scalar of 10. Eg barometric pressure of 101.3 kPa is expressed as 1013.
- \* Speeds are expressed in km/h with a scalar of 10.
- \* The ECU thinks in lambda, rather than air-fuel ratio. All lambda measurements are expressed with a scalar of 1000, ie 1000 means 1.000 lambda. Target lambda has a scalar of 10000, and stoich ratio is a scalar of 1000, ie 14.7:1 is 14700. Target AFR (used only in the fuel calculation) is actually AFR, not "petrol AFR".
- \* All variables are stored as big-endian
- \* Therefore each CAN frame records 4 variables
- \* The variable space in the ECU is 1024 variables long
- \* The address of the first variable is given as the CAN ID minus the base address, times 4
- \* An example of the data payload from a CAN frame appears below:

\*0\*    \*1\*    \*2\*    \*3\*    \*4\*    \*5\*    \*6\*    \*7\*  
Variable 0 high            Variable 0 low   Variable 1 high

Variable 1 low

Variable 2 high

Variable 2 low

Variable 3 high

Variable 3 low

- \* Not all frames are guaranteed to be transmitted; the user can select which variables are transmitted
- \* However the following addresses are always transmitted:

*Offset* variable*	*Live variable address range*	*First variable*	*Second variable*	*Third variable*	*Fourth variable*
4 (S004)	16 - 19	Ext 0-5V 2 input voltage	12V supply voltage	5V sensor supply voltage	Sensor ground voltage
16 (S010)	64 - 67	RPM (unused)	(unused)	(unused)	(unused)
97 (S061)	388 - 391	IMAP	IMAP 2	EMAP	EMAP 2
99 (S063)					

396 - 399

TPS overall

TPS1 (electronic throttle)

	TPS2 (electronic throttle)	TPS3 (electronic throttle)			
100 (S064)	400 - 403	TPS4 (electronic throttle)	Lambda 1	Lambda 2	ECT
101 (S065)	404 - 407	MAT	Oil temp	Fuel temp	Oil pressure
102 (S066)	408 - 411	Fuel gauge pressure	Fuel differential pressure		
	Servo position	Ext 0-5V input 1 (calibrated)			
103 (S067)	412 - 415	Ext 0-5V input 2 (calibrated)	Sensor GND voltage		
	with GND disconnected	Ethanol percentage from sensor	Vehicle speed		
104 (S068)	416 - 419	Gear	Driven speed	Ground (undriven) speed	Slip speed
108 (S06c)	432 - 435	Digital inputs (processed low)		Digital inputs (processed high)	
		Flags (low)	Flags (high)		
117 (S075)	468 - 471	Lateral undriven wheel slip	MGP 1	MGP 2	Knock max (inc bkg)
120 (S078)	480 - 483	Injector duty cycle 1	Injector duty cycle 2		
		Injector duty cycle 3	Injector duty cycle 4		
129 (S081)	516 - 519	Charge temp 1	Charge temp 2	Stoich ratio	
	Target lambda				
138 (S08a)	552 - 553	Fuel mass cyl 15	Fuel mass cyl 16	Fuel inj duration 1	
		Fuel inj duration 2			
163 (S0a3)	652 - 655	Ignition timing (leading)	Ignition timing (trailing)		
		(unused)	(unused)		
165 (S0a5)	660 - 663	Async 1 duration	Async 1 strobe	Async 2 duration	
		Async 2 strobe			
170 (S0aa)	680 - 683	Idle duty cycle from closed loop correction		Idle controller status	
		Unclipped idle effort	Final idle effort		
176 (S0b0)	704 - 707	Cutting conditions	Current RPM limit	Pitlane RPM sampled	
		Pitlane status			
177 (S0b1)	708 - 711	Cut percentage from antilag	Cut percentage from traction control		
		Final fuel cut percentage	Final ignition cut percentage		
186 (S0ba)	744 - 747	Boost control duty cycle 1 unclipped		Final boost control duty cycle 1	
		Boost controller 1 status	Closed loop correction for boost controller 2		

Actual data format

The following is the actual data enabled in this ECU file:

*CAN ID*	*Live var address*	*Name*	*Description*	*Unit*	*Scalar*
S304 16	Voltage_Ext2	Voltage of Ext 2 input.	Max = 5.5V. Input impedance 55kOhm. Resolution = 1.3mV. On the M1200, this pin is used for injector 4 current measurement.		1000
17	Voltage_12V	Voltage of 12V ignition power supply (pin 7 on J2 of M2000 / M6000, pin 1B on M1200). This is not the voltage of the ignition switch input; it's the ECU power supply pin. Max V = 17.5V, resolution = 4.2 mV			1000
18	Voltage_5V	Voltage of 5V sensor output pin. Max V = 17.5V, resolution = 4.2 mV			1000
19	Voltage_SGND	current	Voltage of the sensor ground pin. Max V = 5.5V. Pulled either to ground inside the ECU, or pulled to 3.5V when sensor ground is disabled to check for ground loops. The ECU does this when the		1000
S310 64	RPM	Engine speed in RPM. Sampled over a window of 360 crank degrees or less			1
65	Period for cyl 1	[currently unimplemented]			1000

66	Period for cyl 2	[currently unimplemented]	1000
67	Period for cyl 3	[currently unimplemented]	1000
S361	388	IMAP Intake manifold absolute pressure (as used for calculation)	kPaA 10
389	IMAP 2	Intake manifold absolute pressure for bank 2 (used for calculation - in dual bank mode)	kPaA 10
390	EMAP	Exhaust manifold absolute pressure (as used for calculation)	kPaA 10
391	EMAP 2	Exhaust manifold absolute pressure for bank 2 (as used for calculation - in dual bank mode)	kPaA 10
S363	396	TPS overall TPS value used for throttle based calculations; MAP prediction etc. Should be from the actual throttle sensor.	100
397	TPS 1 (DBW)	TPS from electronic throttle #1	100
398	TPS 2 (DBW)	TPS from electronic throttle #2	100
399	TPS 3 (DBW)	TPS from electronic throttle #3	100
S364	400	TPS 4 (DBW) TPS from electronic throttle #4	100
401	Lambda	Measured lambda value, or lambda for bank 1 in dual bank engines	lambda 1000
402	Lambda 2	Measured lambda value for bank 2 in dual bank engines	lambda 1000
403	ECT	Measured coolant temperature	deg C 10
S365	404	MAT Measured air temperature	deg C 10
405	Oil T	Measured oil temperature	deg C 10
406	Fuel T	Measured fuel temperature	deg C 10
407	Oil P	Measured oil pressure (gauge pressure)	kPaG 10
S366	408	Fuel P Measured fuel pressure (gauge pressure)	kPaG 10
409	Diff Fuel P	Calculated differential fuel pressure (from IMAP, fuel pressure and barometric pressure)	kPaD 10
410	Servo pos	Calibrated servo position from 0-100%. By default, used for metering oil pump position feedback and other things.	10
411	0-5V Ext 1	Calibrated external input 1 0-5V input (not available on M1200)	10
S367	412	0-5V Ext 2 Calibrated external input 2 0-5V input (not available on M1200)	10
413	Sens GND V (GND off)	The sensor ground voltage when the ground output at the ECU was disabled, when the ECU was first powered up. If this is close to zero, it usually means that there's a ground loop and that sensor ground is shorted to the engine outside the ECU. Normally this will be about 1.5V or more.	1000
414	Ethanol Content	Ethanol percentage read from the flex fuel sensor directly, shows dash if there is no valid reading from the sensor or if no direct connection sensor is configured.	10
415	Vehicle speed	Vehicle speed (measured from the driven wheels)	km/h 10
S368	416	Gear number Detected gear number, either from matching RPM/VSS or reading an analogue gear position sensor on the gearbox. In RPM / VSS mode, if the clutch input is active or the vehicle is stopped then the gear number will show zero (neutral).	1
417	Driven speed	Driven wheel speed (average of both wheels on a car with sensors for both wheels)	km/h 10
418	Ground speed	Ground wheel speed (or average of both undriven wheels)	km/h 10
419	Spd diff (drive-gnd)	Driven wheel speed minus ground wheel speed (slip speed)	km/h 10
S36C	432	Dig inp processed low Processed digital inputs. CLUTCH (bit 0), ELEC LOAD (bit 1), AIRCONSW (air conditioner request) (bit 2), WOT (wide open throttle switch input, does not activate when pedal goes to 100%) (bit 3), CLOSEDTHROTTLE (closed throttle switch input, does not activate when TPS=0%, it's for a separate digital switch input) (bit 4),	

NOS (nitrous enable) (bit 5), STRAIN (strain gauge digital input on sequential gear shifter) (bit 6), TURBOCANCEL (cancel turbo timer switch input) (bit 7), ALTMAP (enable fuel / ignition map 2) (bit 8), TC SW (traction control enable switch) (bit 9), LC SW (launch control enable switch) (bit 10), ELECLOAD2 (bit 11), PSTEER (power steering engine load) (bit 12), PUSHTOPASS (push to pass / scramble boost digital input) (bit 13), PITLANESPEED (pit lane speed limit) (bit 14), BOOST1 (boost switch 1 input) (bit 15) 1

433 Dig inp processed hi Processed digital inputs. BOOST2 (boost switch 2 input) (bit 0) 1

434 Flags low Status flags. CLOSEDTHROTTLE (closed throttle condition, either from pedal position on DBW, throttle position on cable throttle, or CLOSEDTHROTTLE digital input) (bit 0), WOT (wide open throttle condition, either from pedal position on DBW, throttle position on cable throttle, or WOT digital input) (bit 1), POWERON (12V power is applied, ECU is calculating / running) (bit 2), CRANKING (engine has not fired yet, it's either stopped or we're cranking) (bit 3), HAVEPERIOD (ECU has TDC information, but not necessarily the cylinder number) (bit 4), HAVE360 (ECU has 360 degrees of information, eg from a crank sensor, but not necessarily 720 degrees - in other words, ECU can do wasted spark ignition on a 4 stroke or direct fire / sequential injection on a 2-stroke / rotary) (bit 5), HAVE720 (ECU has 720 degrees of information, can do fully sequential injection and direct fire ignition on a 4-stroke engine) (bit 6), MAP2 (the second fuel / ignition maps are currently engaged) (bit 7), ACON (Air conditioner is on, additional idle effort enabled) (bit 8), ACCOMPON (Air conditional compressor is on - happens a delay after ACON) (bit 9), THERMO1 (first stage thermofan on) (bit 10), THERMO2 (second stage thermofan) (bit 11), THERMO3 (third stage thermofan) (bit 12), CLUTCH (clutch or neutral input is triggered or car is stopped) (bit 13), HAVE3602 (have had 360 degrees of information for at least 2 crank cycles) (bit 14), HAVE3603 (have had 360 degrees of information for at least 3 crank cycles) (bit 15) 1

435 Flags high Status flags. CLOSEDFUEL (in closed loop fuel mode) (bit 0), CLOSEDIDLE (in closed loop idle mode) (bit 1), IDLEDERIV (idle derivative enabled, eg coming back down to idle) (bit 2), IDLEHOMED (idle stepper motor is homed, happens when ECU is first powered up with 12V) (bit 3), LAUNCHENA (launch control enabled) (bit 4), INLAUNCH (launch control currently triggered) (bit 5), TCENA (traction control enabled) (bit 6), INTC (traction control currently triggered) (bit 7), INANTILAG (antilag currently triggered) (bit 8), FUELPUMPON (fuel pump output triggered) (bit 9), INTWINTURBO (2nd turbo enabled in sequential twin turbo system) (bit 10), CLOSEDBOOST (in closed loop boost mode) (bit 11), LOCKED (ECU settings are locked, can't be read out) (bit 12), NEEDREAD (PC needs to read updated settings out from the ECU) (bit 13), ABOVEOVERRUN (RPM has gone above the overrun RPM threshold) (bit 14), MIN PW CLIP (injector duration has been clipped by the minimum pulsewidth or minimum fuel delivery setting) (bit 15) 1

S375 468 Slip LR Ground Lateral slip of undriven wheels 100

469 MGP1 Manifold gauge pressure for bank 1. Calculated by IMAP 1 - Baro pressure kPaG 10

470 MGP2 Manifold gauge pressure for bank 2. Calculated by IMAP 2 - Baro pressure kPaG 10

471 Knock max (inc bkg) Maximum knock reading of all cylinders (before background is subtracted) 1000

S378 480 Injector 1 duty Duty cycle for injector output 1 100

481 Injector 2 duty Duty cycle for injector output 2 100

482 Injector 3 duty Duty cycle for injector output 3 100

483 Injector 4 duty Duty cycle for injector output 4 100

S381 516 Calc Charge temp 1 Calculated charge temperature for bank 1

	(blend of air temp and coolant temp, in accordance with the manifold heat soak map)	deg C	10	
517	Calc Charge temp 2	Calculated charge temperature for bank 2 (blend of air temp and coolant temp, in accordance with the manifold heat soak map)	deg C	10
518	Stoichiometric ratio	Current stoichiometric ratio, either ECU setting or interpreted from the flex sensor		1000
519	Target Lambda	Target lambda value, looked up from the target lambda map	lambda	10000
S38A 552	Fuel mass cyl 15	Fuel mass to inject for cylinder 15 (after individual cylinder fuel trim)		10
553	Fuel mass cyl 16	Fuel mass to inject for cylinder 16 (after individual cylinder fuel trim)		10
554	Fuel inj dur out 1	Fuel injector duration (pulsewidth) for output 1		1000
555	Fuel inj dur out 2	Fuel injector duration (pulsewidth) for output 2		1000
S3A3 652	Ignition timing	Ignition timing, or ignition timing leading on spark split engines eg rotaries		10
653	Ignition timing (trail)	Ignition timing trailing on spark split engines eg rotaries		10
654	Advance metric (raw)	[currently unimplemented]		1
655	Advance metric (filt)	[currently unimplemented]		1
S3A5 660	Async inj duration	Duration of async injection pulse, for injector outputs 1-16, bank 1		1000
661	Async inj strobe 1-16	Enable async injection for injector outputs 1-16, bank 1		1
662	Async inj duration 2	Duration of async injection pulse, for injector outputs 1-16, bank 2		1000
663	Async inj str 1-16 2	Enable async injection for injector outputs 1-16, bank 2		1
S3AA 680	Idle effort closed lp	Additional idle effort from closed loop idle control		100
681	Idle closed lp status	0 = in open loop, 2 = closed loop idle (derivative only). 3 = in full closed loop idle		1
682	Unclipped idle effort	Idle valves added together (could be less than the minimum value or greater than 100)		100
683	Idle effort / duty	Final idle effort, between the range of the minimum idle effort setting and 100%		100
S3B0 704	Cutting conditions	Power cutting conditions: FUELPT (fuel pressure safety cut) (bit 0), OILT (oil temperature safety cut) (bit 1), OILP (oil pressure safety cut) (bit 2), AFR (lean-out protection) (bit 3), OCINJ (open circuit injector) (bit 4), OVRBOOST (over boost) (bit 5), REVL (rev limiter) (bit 6), OVERRUN (overrun / decel fuel cut) (bit 7), FCLEAR (flood clear, ie injector cut during cranking) (bit 8), PITLANE (ignition cut due to pit lane limit) (bit 9), LAUNCH (ignition / fuel cut due to launch control) (bit 10), ANTILAG (ignition cut due to antilag) (bit 11), FLATSHIFT (ignition cut due to flatshift) (bit 12), ETHROTTLE (TPS is being closed for power reduction) (bit 13), FUEL (fuel cut is in progress) (bit 14), IGN (ignition cut is in progress) (bit 15)		1
705	Current RPM limit	Current RPM limit, from either safety function or the coolant temp dependent rev limit table		1
706	Pitlane RPM limit	Pitlane RPM limit, taken from sampling the RPM when the vehicle speed matched the pitlane speed setting		1
707	Pitlane status	[currently unimplemented]		1
S3B1 708	Pwr cut (antilag)	[currently unimplemented]		1
709	Pwr cut (traction)	[currently unimplemented]		1
710	Fuel cut	Final fuel cut percentage		1

711	Ignition cut	Final ignition cut percentage	1
S3BA 744	Unclipped WG value1	Total wastegate duty cycle 1 (before clipping between zero and maximum value)	100
745	Wastegate 1 duty	Final wastegate duty cycle 1	100
746	Boost ctrl status	Boost controller status. PUSHTOPASS (push to pass currently active) (bit 0)	1
747	Closed lp WG 2 corr	Closed loop correction to wastegate duty cycle	2
	100		