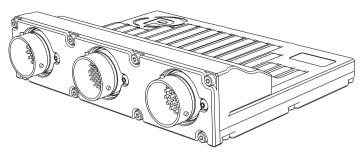
### **Pectel SQ6M ECU**



#### Introduction

The Pectel SQ6M sets the benchmark for high-performance engine management systems. Its Motorola MPC565 microprocessor and dedicated timer co-processor bring class leading performance in a cost-effective package. No other ECU offers the same combination of price, power, performance and flexibility.

Twelve configurable injector drivers combined with eight IGBT ignition outputs AND eight logic level coil driving outputs make this ECU capable of fully sequential fuelling on normally aspirated, turbo and supercharged engines from one to twelve cylinders. Fly-by-wire capability is included, with Stepper and DC motors catered for.

Put all of this functionality in one small light box and you have an ECU capable of working with almost any combination of coil, injector, OEM sensor and actuator.

An all new crank and camshaft pattern recognition system allows the SQ6M to be used with virtually any OEM timing wheel. This sophisticated pattern recognition algorithm also facilitates synchronisation during slow and unevencranking conditions.

Hugely flexible, the SQ6M has two, and sometimes three functions on many of its pins:

- unused injector and IGBT ignition outputs can be used as digital outputs
- unused digital inputs can be used as 10 bit analogue inputs
- H-bridge outputs can be used in either full or half bridge mode, H-bridge outputs can be combined to drive a stepper motor or used to provide additional high or low-side drive capability.

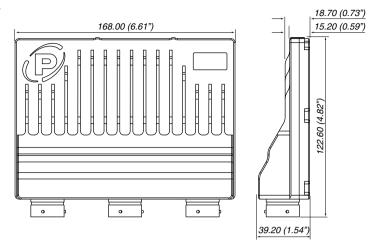
All of these features are enabled by software—there are NO hardware build options. Designed to be robust, the SQ6M has reverse-battery, over-voltage and load dump protection built in as standard. Sensor supply and signal ground pins are also protected against shorts to battery positive and negative.

Advanced software features include traction control, launch control, gearshift strategies, variable valve timing of up to four camshafts (including BMW VANOS), high speed data logging and scrutineering modes for single make championships.

The ECU has optional highly advanced control strategies for semi-automatic/paddle-shift gearboxs which include FBW throttle blip and over rev protection. Customers who have used this have extended gearbox life by 100%.

OE Calibrated with calibration support available on quotation.

#### Dimensions



Dimensions in millimetres (and inches)

Description

#### **Specifications**

Description	Value	
Processor	Motorola MPC565 @ 56MHz, 5 MB flash memory & 4MB non-volatile RAM	
Supply Voltage	8V to 18V reverse battery, over-voltage and load dump protection	
Engine Configuration	1 to 12 cylinders 2/4 stroke or rotary Natural/Forced induction	
Digital Outputs	6 PWM dedicated. (10A peak) 8 PWM alternate. (5A peak) 8 Relay alternate function	
Digital Inputs	10 dedicated	
Data Logging	4MB standard 2000 samples/second	
Crank & Cam Sensor	3 Hall Effect/Inductive	
Quoted currents are peak rating		

Becomption	
Analogue Inputs	12 dedicated (12 bit) 2 x Wide band lambda (12 bit) 2 x Knock sensor (12 bit) 2 x K-type thermocouple (12 bit) 10 alternate function (10 bit
Internal Sensors	ECU Internal Temperature x 4 Battery Voltage
Ignition Drivers	12 IGBT Internal Clamp (400V 20A peak) 4 Logic Level driven
Auxiliary Outputs	<ol> <li>Full Bridge (7A peak)</li> <li>Full Bridge (4A peak) <b>OR</b></li> <li>Stepper Motor alternate function</li> </ol>
Communica- tion	1 RS232 3 CAN 2.0B 1 Ethernet (10MBit)
Case Operat- ing Temp	-25°C to +70°C
Weight	570 grams

Value

Quoted currents are peak rating

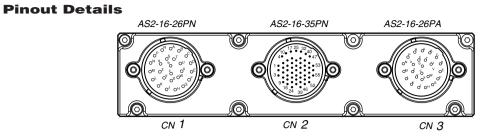
#### **Connector Details**

ECU Connector	Mating Connector
AS2-16-26PN	AS6-16-26SN
AS2-16-26PA	AS6-16-26SA
AS2-16-35PN	AS6-16-35SN

See below for pinout information.

#### **Ordering Information**

Product	Part number
Pectel SQ6M ECU	01E-500720
Pectel SQ6M ECU with gear- box upgrade	01E-500720-E011
Pectel download, Autosport to Ethernet 1.5m	60E-500905
Pectel download, Autosport to Ethernet 10m	60E-500906
Pectel download, Autosport to Serial COM port	60E-500909



SQ6M connectors

#### AS216-26PN Pin information

Pin	Dir	Function	Function	Notes
L	Battery	VBAT	FOLL Bettern / Desitives	104 cont
М	Battery	VBAT	ECU Battery Positives	10A cont.
Y	Battery	ECU GND		104
Z	Battery	ECU GND	ECU Battery Negatives	10A cont. Must be Engine Ground
а	Battery	ECU GND		
К	0	IGN1		
J	0	IGN2		
Н	0	IGN3	Ignition Coile	IGBTs clipped to 450V.
G	0	IGN4	Ignition Coils	20A peak
F	0	IGN5		
Е	0	IGN6		
Х	0	INJ1		
W	0	INJ2		
А	0	INJ3		
R	0	INJ4		
В	0	INJ5		Low side drivers clipped to 45V.
Т	0	INJ6	Injector Outputs	5A peak, 2.5A hold
С	0	INJ7		
U	0	INJ8		
D	0	INJ9		
V	0	INJ10		
b	0	PWM1		
С	0	PWM2		Low side drivers.
Ρ	0	PWM3	PWM Outputs	10A peak. 10k Ohms Pullup to VBAT.
S	0	PWM4		Recirculation diode to VBAT.
Ν	0	PWM5		

ÍΡ

#### AS216-35PN Pin information

Pin	Dir	Function	Function	Notes
20	I	AIN1		
6	I	AIN2		
27	I	AIN3		
2	I	AIN4		Software pullups 3kOhms & 33kOhms
19	I	AIN5	12bit Analogue Inputs	
7	I	AIN6		
18	I	AIN7		
3	I	AIN8		
24	I	AIN9		
8	I	AIN10		Software pullups
23	I	AIN11	12bit Analogue Inputs	3k Ohms & 240 Ohms
9	I	AIN12		
11	Ι	TC1 POS		
4	I	TC2 POS	Thermocouples Positive (12bit)	
13	I	TC NEG	Themocouple Negative	
12	I	LAMV1	Lambda	
17	0	LAMI1	Lambda Current Pump	
5	I	LAMV2	Lambda	
10	0	LAMI2	Lambda Current Pump	
39	I	DET1		
38	I	DET2	Knock Sensor	
40	1	CRANK1		Software Pullup
31	I	CRANK2	Crank Inputs	
41	1	CAM	CAM Input	3k Ohms
49	1	DIN1		
53	1	DIN2		
50	1	DIN3		
54	1	DIN4		
47	1	DIN5		Software Pullup
44		DIN6	Digital Inputs	3k Ohms
42	Ι	DIN7		
48	Ι	DIN8		
35	1	DIN9		
51	I	DIN10		
29	0	RS232TX		
36	I	RS232RX	RS232 port	
21	0	ETHER TXPOS		
28	0	ETHER TXNEG		
22	1	ETHER RXPOS	Ethernet PC comms	
14	1	ETHER RXNEG		

				P
Pin	Dir	Function	Function	Notes
45	I/O	CAN1 LOW		Toursiantad
52	I/O	CAN1 HIGH	CAN Communication parts	
26	I/O	CAN2 LOW	CAN Communication ports	Terminated
32	I/O	CAN2 HIGH		
33	0	OUT 5V0 / 12V	Programmable Sensor Supply	5V, 50mA or 12V, 1A
55	0	OUT 5V0 / 12V	Output 1	
15	0	OUT 5V0 / 12V	Programmable Sensor Supply	5V, 50mA or 12V, 1A
16	0	OUT 5V0 / 12V	Output 2	
46	-	Unused		
1	I/O	ANG GND		
37	I/O	ANG GND		
25	I/O	CRANK/CAM GND	Protected Sensor Grounds 1A cont.	14
30	I/O	DIG GND		TA CONT.
34	I/O	DIG GND		
43	I/O	COMMS GND		

Pin	Dir	Function	Function	Notes	
А	Battery	VBAT		00V/ 10A cost	
В	Battery	VBAT	ECU Battery Positives	20V, 10A cont.	
S	Battery	ECU GND		201/ 10A cont	
Т	Battery	ECU GND	ECU Battery Negatives	20V, 10A cont. Must be Engine Groound	
U	Battery	ECU GND		Must be Engine Groound	
С	0	IGN7	Ignition Coile		
D	0	IGN8	Ignition Coils	400V, 20A peak	
V	0	INJ11			
W	0	INJ12	Injector Outputs	100V, 5A peak, 2.5A hold	
С	0	PWM6	PWM Output	20V, 10A peak.	
				10k Ohms Pullup to VBAT	
F	0	HB3A	DC Motor drivers	20V, 10A peak	
E	0	HB3B	De Motor unvers	200, TOA peak	
Р	0	HB1A			
R	0	HB1B	2 Full Bridge (5A) <b>OR</b> 1 Stepper Motor alternate	20V, 5A peak	
а	0	HB2A	function		
b	0	HB2B	lanoton		
Μ	0	IGNT1			
Ν	0	IGNT2			
L	0	IGNT3			
Z	0	IGNT4	"TTL" Ignitions	EV 20mA cont	
K	0	IGNT5	"TTL" Ignitions	5V, 20mA cont.	
Y	0	IGNT6			
J	0	IGNT7			
Х	0	IGNT8			
G	I/O	CAN3 LOW	CAN Communication part	No termination	
Н	I/O	CAN3 HIGH	CAN Communication port	NO LEITHINALION	

#### AS216-26PA Pin information

# P

## **Declaration of Conformity**

We, the undersigned,

Pi Research Brookfield Motorsports Centre, Cottenham, Cambridgeshire, CB4 8PS United Kingdom

Certify and declare under our sole responsibility that the following equipment:

SQ6M – part number 500720 An ECU for use only in motorsport applications

Conforms to the following EC directives including applicable amendments:

EMC Directive 89/336/EEC, 72/245/EEC (last amended 2004/104/EC)

The following standards have been applied:

2004/104/EC

Cottenham, 27th February 2006

George Lendrum - Director of Motorsport

7