



# HALTECH ECU BROADCAST CAN PROTOCOL

DOCUMENT VERSION 2.0



THIS DOCUMENT DESCRIBES THE CAN PROTOCOL IMPLEMENTED  
WITHIN THE FOLLOWING HALTECH PRODUCTS:

Nexus series ECUs and VCUs  
Elite series ECUs and VCUs

## OVERVIEW

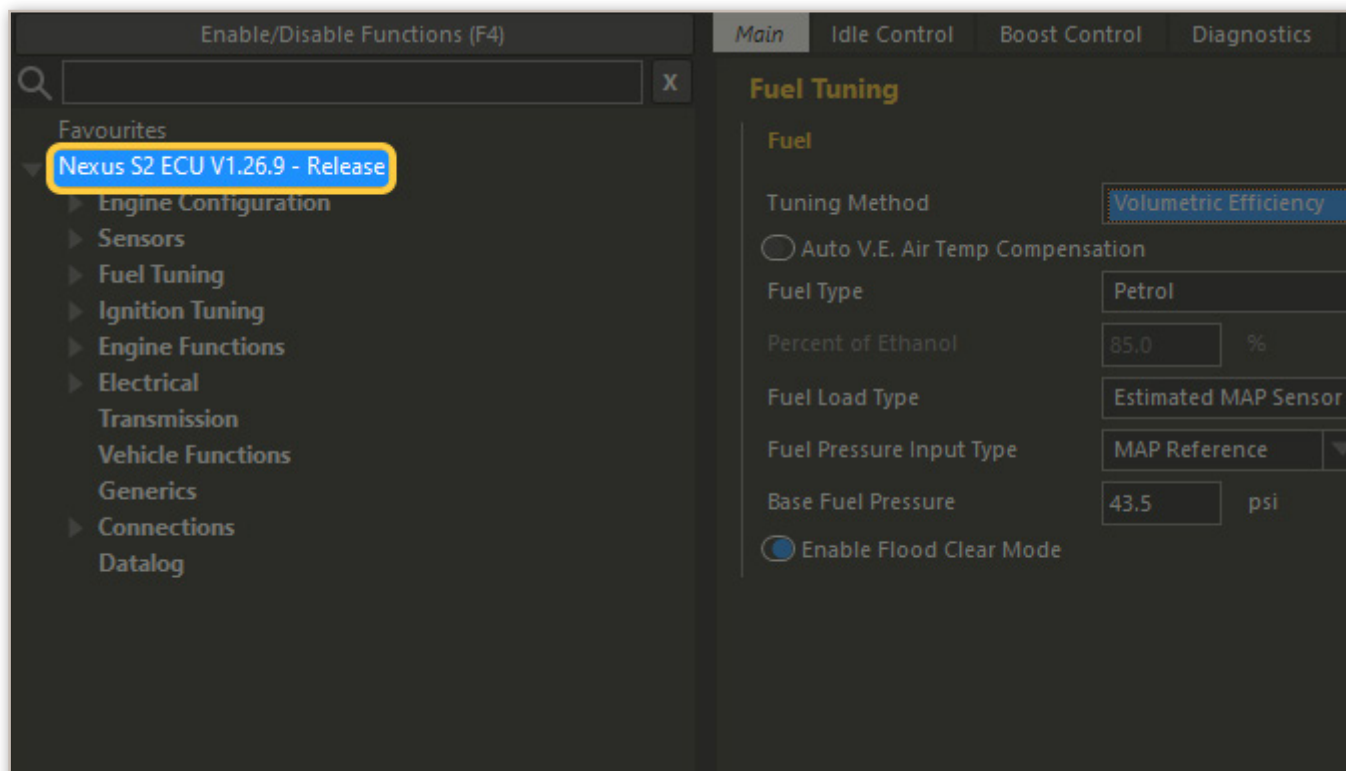
The Haltech Broadcast CAN Protocol, formerly known as the Haltech CAN Dash Protocol, defines the channels and data streams that a Haltech Elite or Nexus ECU broadcasts over the CAN bus. This protocol allows connected display devices, such as Haltech dash displays (iC-7, uC-10), and aftermarket dash systems, to access real-time data from the ECU. Broadcasted channels typically include engine parameters such as RPM, throttle position, temperatures, pressures, and sensor data. By following this protocol, aftermarket dash displays can be configured to interpret and display this information, ensuring accurate monitoring and control of vehicle performance. This allows seamless integration across a range of Haltech and third-party display systems, enhancing versatility and ease of use.

## DEVICE FIRMWARE

Please ensure that your Haltech Nexus or Elite ECU is running the firmware version listed below or a later version. Earlier versions will only support parts of this protocol.

Haltech CAN Device	Required Firmware Version
Nexus series VCUs/ECUs	1.25
Elite Series ECUs	3.11
Haltech dash (iC-7 / uC-10)	1.40

The Haltech Nexus or Elite ECU firmware version can be checked in the Nexus Software Programmer (NSP) while connected to your ECU.



## KEY INFORMATION

The Haltech CAN bus operates at 1 MBit and uses 11-bit IDs. IDs are expressed in Hexadecimal.

The first byte in a packet is considered byte 0, and the 8th byte is 7. The most significant bit in a byte is considered 7 and the least significant is bit 0.

Data is encoded as big-endian.

## ADDRESSING DATA

Data that is the size of an individual byte (that is byte aligned) are represented with the byte number, e.g. 4 for data byte 4.

Data that crosses multiple bytes (that is byte aligned) are represented with a byte range. The range is inclusive, e.g. 0-1 for 2 bytes of data in bytes 0 and 1, 4-7 for 4 bytes of data in bytes 4, 5, 6 and 7.

To address data stored in individual bit within a byte, the following notation is used X:Y. The X is the byte number and Y is the bit number, e.g. 4:0 for bit 0 in byte 4.

To address data stored across many bits that may span bytes, the above notation is used, but expressed as a range. The range is inclusive, e.g. 6:3-7:0 for 12 bits of data starting at bit 3 on the byte 6 to bit 0 on byte 7.

Example:

Byte	0								1								2								3								4								
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
Data	Manifold Pressure								Switch State	Re-served	Input Voltage								Status Enum																						
Value	1013 (0x03F5)								1	0	3000 (0x0BB8)								200 (0xC8)																						
Addressing	0 - 1								2:07	2:6-2:4	2:3-3:0								4																						
	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	1	0	0	0	1	0	1	1	1	0	1	1	1	0	0	0	0	1	1	0	0	1	0	0	0

## UNITS

The "Conversion from Raw" column in the example protocol specification table below, shows how to convert the raw value in the message to a value known unit as indicated by the "Units" column.

The x symbol represents the raw value and y represents the value converted.

E.g. The "Throttle Position" channel has a raw value of 456. The conversion for it is  $y = x / 10$ . Therefore the converted value of y equals:

$$y = 456 / 10 = 45.6\%$$

If other units are required, it is the responsibility of the device reading these values to perform these conversions. All pressures are absolute, and it is necessary to subtract 101.3 kPa from the final result if gauge pressure is desired.

CAN ID	Rate (Hz)	Direction	Message Position	Sign	Channel	Units	Conversion from Raw
0x360	50	TX	0 - 1	Unsigned	RPM	RPM	$y = x$
			2 - 3	Unsigned	Manifold Pressure	kPa (Abs)	$y = x/10$
			4 - 5	Unsigned	Throttle Position	%	$y = x/10$
			6 - 7	Unsigned	Coolant Pressure	kPa	$y = x/10 - 101.3$
0x361	50	TX	0 - 1	Unsigned	Fuel Pressure	kPa	$y = x/10 - 101.3$
			2 - 3	Unsigned	Oil Pressure	kPa	$y = x/10 - 101.3$
			4 - 5	Unsigned	Engine Demand	%	$y = x/10$
			6 - 7	Unsigned	Wastegate Pressure	kPa	$y = x/10 - 101.3$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x360	50	TX	0 - 1	Unsigned	RPM	RPM	$y = x$
			2 - 3	Unsigned	Manifold Pressure	kPa (Abs)	$y = x/10$
			4 - 5	Unsigned	Throttle Position	%	$y = x/10$
			6 - 7	Unsigned	Coolant Pressure	kPa	$y = x/10 - 101.3$
0x361	50	TX	0 - 1	Unsigned	Fuel Pressure	kPa	$y = x/10 - 101.3$
			2 - 3	Unsigned	Oil Pressure	kPa	$y = x/10 - 101.3$
			4 - 5	Unsigned	Engine Demand	%	$y = x/10$
			6 - 7	Unsigned	Wastegate Pressure	kPa	$y = x/10 - 101.3$
0x362	50	TX	0 - 1	Unsigned	Injection Stage 1 Duty Cycle	%	$y = x/10$
			2 - 3	Unsigned	Injection Stage 2 Duty Cycle	%	$y = x/10$
			4 - 5	Signed	Ignition Angle (Leading)	°	$y = x/10$
0x363	20	TX	0 - 1	Signed	Wheel Slip	km/h	$y = x/10$
			2 - 3	Signed	Wheel Diff	km/h	$y = x/10$
			4 - 5	-	-	-	-
			6 - 7	Unsigned	Launch Control End RPM	RPM	$y = x$
0x364	50	TX	0 - 1	Unsigned	Injection Stage 1 Average Injection Time	ms	$y = x/1000$
			2 - 3	Unsigned	Injection Stage 2 Average Injection Time	ms	$y = x/1000$
			4 - 5	Unsigned	Injection Stage 3 Average Injection Time	ms	$y = x/1000$
			6 - 7	Unsigned	Injection Stage 4 Average Injection Time	ms	$y = x/1000$
0x368	20	TX	0 - 1	Unsigned	Wideband Sensor 1	λ	$y = x/1000$
			2 - 3	Unsigned	Wideband Sensor 2	λ	$y = x/1000$
			4 - 5	Unsigned	Wideband Sensor 3	λ	$y = x/1000$
			6 - 7	Unsigned	Wideband Sensor 4	λ	$y = x/1000$
0x369	20	TX	0 - 1	Unsigned	Trigger System Error Count	raw	$y = x$
			2 - 3	Unsigned	Trigger Counter	raw	$y = x$
			6 - 7	Unsigned	Trigger Sync Level	raw	$y = x$
0x36A	20	TX	0 - 1	Unsigned	Knock Level 1	dB	$y = x/100$
			2 - 3	Unsigned	Knock Level 2	dB	$y = x/100$
0x36B	20	TX	0 - 1	Unsigned	Brake Pressure Front	kPa	$y = x - 101.3$
			2 - 3	Unsigned	NOS Pressure Sensor 1	kPa	$y = x*11/50 - 101.3$ . Saturated at 14316.4 kPa, 14417.7 kPa absolute, 2076 psi.
			4 - 5	Unsigned	Turbo Speed Sensor 1	RPM	$y = x*10$
			6 - 7	Signed	Lateral G	m/s2	$y = x/10$

# PROTOCOL SPECIFICATION

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x36C	20	TX	0 - 1	Unsigned	Wheel Speed Front Left	km/h	$y = x/10$
			2 - 3	Unsigned	Wheel Speed Front Right	km/h	$y = x/10$
			4 - 5	Unsigned	Wheel Speed Rear Left	km/h	$y = x/10$
			6 - 7	Unsigned	Wheel Speed Rear Right	km/h	$y = x/10$
0x36D	20	TX	4 - 5	Signed	Exhaust Cam Angle 1	°	$y = x/10$
			6 - 7	Signed	Exhaust Cam Angle 2	°	$y = x/10$
0x36E	20	TX	0 - 1	Unsigned	Engine Limiting Active	boolean	0=Off, 1=On
			2 - 3	Signed	Launch Control Ignition Retard	°	$y = x/10$
			4 - 5	Signed	Launch Control Fuel Enrich	%	$y = x/10$
			6 - 7	Signed	Longitudinal G	m/s <sup>2</sup>	$y = x/10$
0x36F	20	TX	0 - 1	Unsigned	Generic Output 1 Duty Cycle	%	$y = x/10$
			2 - 3	Unsigned	Boost Control Output	%	$y = x/10$
0x370	20	TX	0 - 1	Unsigned	Vehicle Speed	km/h	$y = x/10$
			2 - 3	Signed	Combined Gear	enum	This is the combination of both the gear & selector position channels. Selector Position = $(x >> 8)$ & 0xFF Gear = $x \& 0xFF$
			4 - 5	Signed	Intake Cam Angle 1	°	$y = x/10$
			6 - 7	Signed	Intake Cam Angle 2	°	$y = x/10$
0x371	10	TX	0 - 1	Unsigned	Fuel Flow	cc/min	$y = x$
			2 - 3	Unsigned	Fuel Flow Return	cc/min	$y = x$
0x372	10	TX	0 - 1	Unsigned	Battery Voltage	Volts	$y = x/10$
			4 - 5	Unsigned	Target Boost Level	kPa	$y = x/10$
			6 - 7	Unsigned	Barometric Pressure	kPa (Abs)	$y = x/10$
0x373	10	TX	0 - 1	Unsigned	EGT Sensor 1	K	$y = x/10$
			2 - 3	Unsigned	EGT Sensor 2	K	$y = x/10$
			4 - 5	Unsigned	EGT Sensor 3	K	$y = x/10$
			6 - 7	Unsigned	EGT Sensor 4	K	$y = x/10$
0x374	10	TX	0 - 1	Unsigned	EGT Sensor 5	K	$y = x/10$
			2 - 3	Unsigned	EGT Sensor 6	K	$y = x/10$
			4 - 5	Unsigned	EGT Sensor 7	K	$y = x/10$
			6 - 7	Unsigned	EGT Sensor 8	K	$y = x/10$
0x375	10	TX	0 - 1	Unsigned	EGT Sensor 9	K	$y = x/10$
			2 - 3	Unsigned	EGT Sensor 10	K	$y = x/10$
			4 - 5	Unsigned	EGT Sensor 11	K	$y = x/10$
			6 - 7	Unsigned	EGT Sensor 12	K	$y = x/10$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x376	10	TX	0 - 1	Unsigned	Ambient Air Temperature	K	$y = x/10$
			2 - 3	Signed	Relative Humidity	%	$y = x/10$
			4 - 5	Unsigned	Specific Humidity	ppm	$y = x*100$
			6 - 7	Unsigned	Absolute Humidity	g/m3	$y = x/10$
0x377	50	TX	0 - 1	Unsigned	Boost Pressure Pre Intercooler	kPa	$y = x/10$
0x380	10	TX	0 - 1	Unsigned	Generic Output 1 Value	raw	$y = x$
			2 - 3	Unsigned	Generic Output 2 Value	raw	$y = x$
			4 - 5	Unsigned	Generic Output 3 Value	raw	$y = x$
			6 - 7	Unsigned	Generic Output 4 Value	raw	$y = x$
0x3E0	5	TX	0 - 1	Unsigned	Coolant Temperature	K	$y = x/10$
			2 - 3	Unsigned	Air Temperature	K	$y = x/10$
			4 - 5	Unsigned	Fuel Temperature	K	$y = x/10$
			6 - 7	Unsigned	Oil Temperature	K	$y = x/10$
0x3E1	5	TX	0 - 1	Unsigned	Gearbox Oil Temperature	K	$y = x/10$
			2 - 3	Unsigned	Diff Oil Temperature	K	$y = x/10$
			4 - 5	Unsigned	Fuel Composition	%	$y = x/10$
			6 - 7	Unsigned	Air Temperature Pre Intercooler	K	$y = x/10$
0x3E2	5	TX	0 - 1	Unsigned	Fuel Level	L	$y = x/10$
			2 - 3	Signed	Fuel Volume Estimated Flow	cc/min	$y = x/10$
			4 - 5	Unsigned	Average Fuel Consumption Mileage	Km/L	$y = x/10$
			6 - 7	Unsigned	Fuel Level	L	$y = x/10$
0x3E3	5	TX	0 - 1	Signed	Fuel Trim Short Term Bank 1	%	$y = x/10$
			2 - 3	Signed	Fuel Trim Short Term Bank 2	%	$y = x/10$
			4 - 5	Signed	Fuel Trim Long Term Bank 1	%	$y = x/10$
			6 - 7	Signed	Fuel Trim Long Term Bank 2	%	$y = x/10$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x3E4	5	TX	1 : 7	Unsigned	Neutral Switch	boolean	0=Off, 1=On
			1 : 6	Unsigned	Reverse Switch	boolean	0=Off, 1=On
			1 : 5	Unsigned	Gear Switch	boolean	0=Off, 1=On
			1 : 4	Unsigned	Decel Cut Active	boolean	0=Off, 1=On
			1 : 3	Unsigned	Transient Throttle Active	boolean	0=Off, 1=On
			1 : 2	Unsigned	Brake Pedal Switch	boolean	0=Off, 1=On
			1 : 1	Unsigned	Clutch Switch	boolean	0=Off, 1=On
			1 : 0	Unsigned	Oil Pressure Light	boolean	0=Off, 1=On
			2 : 7	Unsigned	Launch Control Active	boolean	0=Off, 1=On
			2 : 6	Unsigned	Launch Control Switch	boolean	0=Off, 1=On
			2 : 5	Unsigned	Aux RPM Limiter Active	boolean	0=Off, 1=On
			2 : 4	Unsigned	Brake Fluid Level Switch	boolean	0=Off, 1=On
			2 : 3	Unsigned	Flat Shift Switch	boolean	0=Off, 1=On
			2 : 2	Unsigned	Clutch Pressure Sensor	boolean	0=Off, 1=On
			2 : 1	Unsigned	Torque Reduction Active	boolean	0=Off, 1=On
			3 : 7	Unsigned	Traction Control Enabled	boolean	0=Off, 1=On. See Traction Control States section.
			3 : 6	Unsigned	Traction Control Active	boolean	0=Off, 1=On. See Traction Control States section.
			3 : 5	Unsigned	Air Con Request	boolean	0=Off, 1=On
			3 : 4	Unsigned	Air Con Output	boolean	0=Off, 1=On
			3 : 3	Unsigned	Thermo-fan 4 On	boolean	0=Off, 1=On
			3 : 2	Unsigned	Thermo-fan 3 On	boolean	0=Off, 1=On
			3 : 1	Unsigned	Thermo-fan 2 On	boolean	0=Off, 1=On
			3 : 0	Unsigned	Thermo-fan 1 On	boolean	0=Off, 1=On
			4	Signed	Rotary Trim Pot 1	raw	y = x
			5	Signed	Rotary Trim Pot 2	raw	y = x
			6	Signed	Rotary Trim Pot 3	raw	y = x
			7 : 7	Unsigned	Check Engine Light	boolean	0=Off, 1=On
			7 : 6	Unsigned	Battery Light Active	boolean	0=Off, 1=On
			7 : 1	Unsigned	Hand Brake State	boolean	0=Off, 1=On
			7 : 0	Unsigned	Traction Control Light	boolean	0=Off, 1=On. See Traction Control States section.

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x3E5	50	TX	0	Unsigned	Ignition Switch	boolean	0=Off, 1=On
			1	Unsigned	Turbo Timer - Time Remaining	s	$y = x$
			2	Unsigned	Turbo Timer - Engine Time Remaining	s	$y = x$
			3 : 7	-	-	-	-
			3 : 6	Unsigned	Pit Lane Speed Limiter Error	enum	0=OK,1=Error
			3 : 5	Unsigned	Pit Lane Speed Limiter Active	enum	0=Inactive,1=Active
			3 : 4	Unsigned	Pit Lane Speed Limiter Switch State	boolean	0=Off, 1=On
			3 : 3	-	-	-	-
			3 : 2	Unsigned	ABS Error	enum	0=OK,1=Error
			3 : 1	Unsigned	ABS Active	enum	0=Inactive,1=Active
			3 : 0	Unsigned	ABS Armed	enum	0=Not Armed, 1=Armed
			4 - 5	Signed	Steering Wheel Angle	°	$y = x/10$
6 - 7	Unsigned	Driveshaft RPM	RPM	$y = x$			
0x3E6	20	TX	0 - 1	Unsigned	NOS Pressure Sensor 2	kPa	$y = x*11/50 - 101.3$ . Saturated at 14316.4 kPa,14417.7 kPa absolute, 2076 psi.
			2 - 3	Unsigned	NOS Pressure Sensor 3	kPa	$y = x*11/50 - 101.3$ . Saturated at 14316.4 kPa,14417.7 kPa absolute, 2076 psi.
			4 - 5	Unsigned	NOS Pressure Sensor 4	kPa	$y = x*11/50 - 101.3$ . Saturated at 14316.4 kPa,14417.7 kPa absolute, 2076 psi.
			6 - 7	Unsigned	Turbo Speed Sensor 2	RPM	$y = x*10$
0x3E7	20	TX	0 - 1	Unsigned	Generic Sensor 1		See Generic Sensors.
			2 - 3	Unsigned	Generic Sensor 2		See Generic Sensors.
			4 - 5	Unsigned	Generic Sensor 3		See Generic Sensors.
			6 - 7	Unsigned	Generic Sensor 4		See Generic Sensors.
0x3E8	20	TX	0 - 1	Unsigned	Generic Sensor 5		See Generic Sensors.
			2 - 3	Unsigned	Generic Sensor 6		See Generic Sensors.
			4 - 5	Unsigned	Generic Sensor 7		See Generic Sensors.
			6 - 7	Unsigned	Generic Sensor 8		See Generic Sensors.

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x3E9	20	TX	0 - 1	Unsigned	Generic Sensor 9		See Generic Sensors.
			2 - 3	Unsigned	Generic Sensor 10		See Generic Sensors.
			4 - 5	Unsigned	Target Lambda	λ	$y = x/1000$
			6 : 7	Unsigned	Nitrous Stage 1 Output State	boolean	0=Off, 1=On
			6 : 6	Unsigned	Nitrous Stage 2 Output State	boolean	0=Off, 1=On
			6 : 5	Unsigned	Nitrous Stage 3 Output State	boolean	0=Off, 1=On
			6 : 4	Unsigned	Nitrous Stage 4 Output State	boolean	0=Off, 1=On
			6 : 3	Unsigned	Nitrous Stage 5 Output State	boolean	0=Off, 1=On
			6 : 2	Unsigned	Nitrous Stage 6 Output State	boolean	0=Off, 1=On
			6 : 1	Unsigned	Water Injection Advanced Output State	boolean	0=Off, 1=On
			7	Signed	Torque Management Knob	raw	$y = x$
0x3EA	50	TX	0 - 1	Unsigned	Gearbox Line Pressure	kPa	$y = x/10 - 101.3$
			2 - 3	Unsigned	Injection Stage 3 Duty Cycle	%	$y = x/10$
			4 - 5	Unsigned	Injection Stage 4 Duty Cycle	%	$y = x/10$
			6 - 7	Unsigned	Crank Case Pressure	kPa	$y = x/10 - 101.3$
0x3EB	50	TX	0 - 3	Unsigned	Race Timer	ms	$y = x$
			4 - 5	Signed	Ignition Angle Bank 1	°	$y = x/10$
			6 - 7	Signed	Ignition Angle Bank 2	°	$y = x/10$
0x3EC	50	TX	0 - 1	Signed	Torque Management Driveshaft RPM Target	RPM	$y = x$
			2 - 3	Signed	Torque Management Driveshaft RPM Target Error	RPM	$y = x$
			4 - 5	Signed	Torque Management Driveshaft RPM Target Error Ignition Correction	°	$y = x/10$
			6 - 7	Signed	Torque Management Driveshaft RPM Timed Ignition Correction	°	$y = x/10$
0x3ED	50	TX	0 - 1	Signed	Torque Management Combined Ignition Correction	°	$y = x/10$
0x3EE	20	TX	0 - 1	Unsigned	Wideband Sensor 5	λ	$y = x/1000$
			2 - 3	Unsigned	Wideband Sensor 6	λ	$y = x/1000$
			4 - 5	Unsigned	Wideband Sensor 7	λ	$y = x/1000$
			6 - 7	Unsigned	Wideband Sensor 8	λ	$y = x/1000$
0x3EF	20	TX	0 - 1	Unsigned	Wideband Sensor 9	λ	$y = x/1000$
			2 - 3	Unsigned	Wideband Sensor 10	λ	$y = x/1000$
			4 - 5	Unsigned	Wideband Sensor 11	λ	$y = x/1000$
			6 - 7	Unsigned	Wideband Sensor 12	λ	$y = x/1000$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x3F0	50	TX	0 - 1	Unsigned	Shock Travel Sensor Front Left (Uncalibrated)	mm	$y = x / 10$
			2 - 3	Unsigned	Shock Travel Sensor Front Right (Uncalibrated)	mm	$y = x / 10$
			4 - 5	Unsigned	Shock Travel Sensor Rear Left (Uncalibrated)	mm	$y = x / 10$
			6 - 7	Unsigned	Shock Travel Sensor Rear Right (Uncalibrated)	mm	$y = x / 10$
0x3F1	50	TX	0 - 1	Signed	Shock Travel Sensor Front Left	mm	$y = x / 10$
			2 - 3	Signed	Shock Travel Sensor Front Right	mm	$y = x / 10$
			4 - 5	Signed	Shock Travel Sensor Rear Left	mm	$y = x / 10$
			6 - 7	Signed	Shock Travel Sensor Rear Right	mm	$y = x / 10$
0x3F2	20	TX	0 - 1	Signed	Ride Height Sensor Front	mm	Minimum version: Nexus 1.25 Elite 3.11
			2 - 3	Signed	Ride Height Sensor Front Uncalibrated	mm	0 if there's an error (e.g. No Signal, Calibrating or Device Timeout)
			4 - 5	Signed	Ride Height Sensor Front Derivative	mm/s	otherwise: $y = x / 10$
			6 - 7		Reserved for future use.		
0x3F3	20	TX	0 - 1	Signed	Ride Height Sensor Rear	mm	Minimum version: Nexus 1.25, Elite 3.11
			2 - 3	Signed	Ride Height Sensor Rear Uncalibrated	mm	0 if there's an error (e.g. No Signal, Calibrating or Device Timeout)
			4 - 5	Signed	Ride Height Sensor Rear Derivative	mm/s	otherwise: $y = x / 10$
			6 - 7		Reserved for future use.		
0x469	5	TX	0 - 1	Unsigned	ECU Temperature	K	$y = x/10$
			4 - 5	Unsigned	Oil level Percentage	%	$y = x/10$
			-	-	-	-	-

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x470	20	TX	0 - 1	Unsigned	Wideband Overall	λ	$y = x/1000$
			2 - 3	Unsigned	Wideband Bank 1	λ	$y = x/1000$
			4 - 5	Unsigned	Wideband Bank 2	λ	$y = x/1000$
			6	Signed	Gear Selector Position	enum	1 - 10: 1 - 10 0: Neutral -1: Reverse, -2: Park, -3: Unknown, -4: Drive, -5: Sport, -6: Manual, -7: Low, -8: Overdrive
			7	Signed	Gear	enum	1 - 10: 1 - 10 0: Neutral -1: Reverse, -2: Park, -3: Unknown, -4: Drive, -5: Sport, -6: Manual, -7: Low, -8: Overdrive
0x471	50	TX	0 - 1	Signed	Injector Pressure Differential	kPa	$y = x/10$
			2 - 3	Unsigned	Accelerator Pedal Position	%	$y = x/10$
			4 - 5	Unsigned	Exhaust Manifold Pressure	kPa	$y = x/10$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x472	20	TX	0 - 1	Unsigned	Cruise Control Target Speed	km/h	$y = x/10$
			2 - 3	Unsigned	Cruise Control Last Target Speed	km/h	$y = x/10$
			4 - 5	Signed	Cruise Control Speed Error	km/h	$y = x/10$
			6 : 7 - 6 : 4	Unsigned	Cruise Control Controller State	enum	0=Disabled 1=Inactive 2=Cruising 3=Accelerating 4=Decelerating 5 = Cancelling 6 = Disabling
			6 : 3 - 7 : 0	Unsigned	Cruise Control Input State	bit-field	0=Unused, 1=Disable, 2=Enable, 3=Enable/Disable, 4=Cancel, 8=Set, 12=Set/Cancel, 16=Resume, 20=Resume/Cancel, 32=Accel, 64=Decel, 76=Set/Coast/Cancel, 84=Resume/Coast/Cancel, 128=Increment, 168=Set/Accel/+, 176=Resume/Accel/+, 256=Decrement, 328=Set/Coast/-, 336=Resume/Coast/-, 512=Rest Position

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x473	10	TX	0 - 3	Unsigned	Total Fuel Used	cc	y = x
			4 : 7	Unsigned	Rolling Antilag Switch State	boolean	0=Off, 1=On
			4 : 6	Unsigned	Antilag Switch State	boolean	0=Off, 1=On
			4 : 5	Unsigned	Antilag Output State	boolean	0=Off, 1=On
			4 : 4	Unsigned	Traction Control Switch State	boolean	0=Off, 1=On
			4 : 3	Unsigned	Primary Fuel Pump Output State	boolean	0=Off, 1=On
			4 : 2	Unsigned	Aux 1 Fuel Pump Output State	boolean	0=Off, 1=On
			4 : 1	Unsigned	Aux 2 Fuel Pump Output State	boolean	0=Off, 1=On
			4 : 0	Unsigned	Aux 3 Fuel Pump Output State	boolean	0=Off, 1=On
			5 : 7	Unsigned	Nitrous Enable 1 Switch State	boolean	0=Off, 1=On
			5 : 6	Unsigned	Nitrous Enable 1 Output State	boolean	0=Off, 1=On
			5 : 5	Unsigned	Nitrous Enable 2 Switch State	boolean	0=Off, 1=On
			5 : 4	Unsigned	Nitrous Enable 2 Output State	boolean	0=Off, 1=On
			5 : 3	Unsigned	Nitrous Enable 3 Switch State	boolean	0=Off, 1=On
			5 : 2	Unsigned	Nitrous Enable 3 Output State	boolean	0=Off, 1=On
			5 : 1	Unsigned	Nitrous Enable 4 Switch State	boolean	0=Off, 1=On
			5 : 0	Unsigned	Nitrous Enable 4 Output State	boolean	0=Off, 1=On
			6 : 7	Unsigned	Nitrous Override 1 Switch State	boolean	0=Off, 1=On
			6 : 6	Unsigned	Nitrous Override 1 Output State	boolean	0=Off, 1=On
			6 : 5	Unsigned	Nitrous Override 2 Switch State	boolean	0=Off, 1=On
			6 : 4	Unsigned	Nitrous Override 2 Output State	boolean	0=Off, 1=On
			6 : 3	Unsigned	Nitrous Override 3 Switch State	boolean	0=Off, 1=On
			6 : 2	Unsigned	Nitrous Override 3 Output State	boolean	0=Off, 1=On
			6 : 1	Unsigned	Nitrous Override 4 Switch State	boolean	0=Off, 1=On
			6 : 0	Unsigned	Nitrous Override 4 Output State	boolean	0=Off, 1=On
			7 : 7	Unsigned	Water Injection Advanced Enable Switch State	boolean	0=Off, 1=On
			7 : 6	Unsigned	Water Injection Advanced Enable Output State	boolean	0=Off, 1=On
			7 : 5	Unsigned	Water Injection Advanced Override Switch State	boolean	0=Off, 1=On
7 : 4	Unsigned	Water Injection Advanced Override Output State	boolean	0=Off, 1=On			
7 : 3 - 7 : 0	Unsigned	Cut Percentage Method	enum	0 = No Cut 1 = Fuel 2 = Ignition 3 = Fuel and Ignition			

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x474	20	TX	0 - 1	Signed	Vertical G	m/s <sup>2</sup>	$y = x/10$
			2 - 3	Signed	Pitch Rate	deg/s	$y = x/10$
			4 - 5	Signed	Roll Rate	deg/s	$y = x/10$
			6 - 7	Signed	Yaw Rate	deg/s	$y = x/10$
0x475	5	TX	0 - 1	Unsigned	Primary Fuel Pump Duty Cycle	%	$y = x/10$
			2 - 3	Unsigned	Aux 1 Fuel Pump Duty Cycle	%	$y = x/10$
			4 - 5	Unsigned	Aux 2 Fuel Pump Duty Cycle	%	$y = x/10$
			6 - 7	Unsigned	Aux 3 Fuel Pump Duty Cycle	%	$y = x/10$
0x476	20	TX	0 - 1	Unsigned	Brake Pressure Rear	kPa	$y = x - 101.3$
			2 - 3	Unsigned	Brake Pressure Front Ratio	%	$y = x/10$
			4 - 5	Unsigned	Brake Pressure Rear Ratio	%	$y = x/10$
			6 - 7	Signed	Brake Pressure Difference (Front minus Rear)	kPa (Abs)	$y = x$
0x477	10	TX	0 - 1	Unsigned	Engine Limiter Max RPM	RPM	$y = x$
			2 - 3	Unsigned	Cut Percentage	%	$y = x/10$
			4	Unsigned	Engine Limiter Function	enum	Engine Limiting Functions table
			5	Unsigned	RPM Limiter Function	enum	Engine Limiting Functions table
			6	Unsigned	Cut Percentage Function	enum	Engine Limiting Functions table
			7 : 7 - 7 : 4	Unsigned	Engine Limiter Method	enum	0 = No Cut 1 = Fuel 2 = Ignition 3 = Fuel and Ignition
			7 : 3 - 7 : 0	Unsigned	RPM Limiter Method	enum	0 = No Cut 1 = Fuel 2 = Ignition 3 = Fuel and Ignition
0x6F0	5	TX	0 - 1	Unsigned	Front Left Tyre Pressure	kPa	CAN Error Values table otherwise: $y = x/10 - 101.3$
			2 - 3	Unsigned	Front Right Tyre Pressure	kPa	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10 - 101.3$
			4 - 5	Unsigned	Rear Left Tyre Pressure	kPa	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10 - 101.3$
			6 - 7	Unsigned	Rear Right Tyre Pressure	kPa	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10 - 101.3$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x6F1	5	TX	0 - 1	Unsigned	Front Left Tyre Temperature	K	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10$
			2 - 3	Unsigned	Front Right Tyre Temperature	K	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10$
			4 - 5	Unsigned	Rear Left Tyre Temperature	K	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10$
			6 - 7	Unsigned	Rear Right Tyre Temperature	K	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10$
0x6F2	5	TX	0 - 1	Unsigned	Front Left Tyre Sensor Battery Voltage	V	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/1000$
			2 - 3	Unsigned	Front Right Tyre Sensor Battery Voltage	V	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/1000$
			4 - 5	Unsigned	Rear Left Tyre Sensor Battery Voltage	V	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/1000$
			6 - 7	Unsigned	Rear Right Tyre Sensor Battery Voltage	V	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/1000$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x6F3	5	TX	0 - 1	Unsigned	Front Tyre Recommended Pressure	kPa	$y = x/10 - 101.3$
			2 - 3	Unsigned	Rear Tyre Recommended Pressure	kPa	$y = x/10 - 101.3$
			4 : 3	Unsigned	Rear Right Tyre Air Leak Detected	boolean	0=No Leak,1=Leak Detected
			4 : 2	Unsigned	Rear Left Tyre Air Leak Detected	boolean	0=No Leak,1=Leak Detected
			4 : 1	Unsigned	Front Right Tyre Air Leak Detected	boolean	0=No Leak,1=Leak Detected
			4 : 0	Unsigned	Front Left Tyre Air Leak Detected	boolean	0=No Leak,1=Leak Detected
			5	Unsigned	Engine Protection Severity Level	raw	0 - Idle 1 - Level 1 2 - Level 2 3 - Level 3
			6 - 7	Unsigned	Engine Protection Reason	enum	This value is hexadecimal, and represents the OBDII DTC. The upper 2 bits determine which letter it is (0b00 = P, 0b01 = B, 0b10 = C, 0b11 = U). The remaining 14 bits, when viewed as hexadecimal are the number part of the code. e.g. 0x2A00 = P2A00 = "Wideband 1 Sensor Failure. See Wideband O2 1 channel."
0x6F4	100	TX	0 : 0	Unsigned	Park Light State	boolean	0=Off, 1=On
			0 : 1	Unsigned	Head Light State	boolean	0=Off, 1=On
			0 : 2	Unsigned	High Beam Light State	boolean	0=Off, 1=On
			0 : 3	Unsigned	Left Indicator State	boolean	0=Off, 1=On
			0 : 4	Unsigned	Right Indicator State	boolean	0=Off, 1=On
			1 : 0 - 1 : 3	Unsigned	Engine State	enum	0: Stopped 1: Cranking 2: Idling 3: Running 4: Limiting
0x6F6	5	TX	0 - 3	Signed	Total Fuel Used Since Trip 1 Reset	cc	$y = x$
			4 - 7	Signed	Trip Meter 1	m	$y = x$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x6F7	10	TX	0 - 3	Unsigned	Generic Output 1 - 20 States	bit-field	0 = Off, 1 = On (at least 0.1% duty cycle if in Duty Cycle mode, or at least 1 Hz if in Frequency mode) Bit X = Generic output X+1
			4 - 5	Unsigned	Calculated Air Temperature	K	$y = x/10$
			6 - 7	Unsigned	Water Injection Advanced Solenoid Duty Cycle	%	$y = x / 10$
0x6F8	5	TX	0	Signed	Exhaust Cutout State	enum	-1: Input Error 0: Disabled 1: Closed 2: Opening 3: Open 4: Closing 5: Paused Part Way
			1	Signed	Nitrous Bottle Opener State	enum	
			2	Signed	Generic Open Loop Motor Control 1 State	enum	
			3	Signed	Generic Open Loop Motor Control 2 State	enum	
			4	Signed	Generic Open Loop Motor Control 3 State	enum	
			5		Reserved for future use.		
6 - 7	Unsigned	Fuel Level Percentage 0	%	$y = x / 10$			
0x6F9	5	TX	0 - 1	Unsigned	Fuel Level Percentage 1	%	$y = x / 10$
			2 - 7		Reserved for future use.		
0x6FF	20	TX	0 - 1	Signed	Torque Converter Pressure	kPa	0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/10 - 101.3$
			2 - 3	Signed	Transfer Case Pressure		
			4 - 5	Signed	Air Conditioner Pressure		
			6 - 7	Signed	Power Steering Pressure		0 = error (can be No Signal, Calibrating or Device Timeout) otherwise: $y = x/100 - 101.3$

CAN ID	Rate (Hz)	Direction	Message position	Sign	Channel	Units	Conversion from raw
0x700	50	TX	0 - 1	Unsigned			Sends out HBO, HCO8, HCO25 information as per the PD16 to ECU protocol for the internal R5 PDM. See Multiplexed CAN protocol for more detailed information.
			2 - 3	Unsigned			
			4 - 5	Unsigned			
			6 - 7	Unsigned			
0x701	20	TX	0 - 1	Unsigned	Fuel Consumption Average Economy	L/100km	y = x/10
			2 - 3	Unsigned	Fuel Consumption Instantaneous Economy	L/100km	
			4 - 5	Signed	Air Conditioner Temperature	K	y = x/10
			5 - 6	Unsigned	Fuel Consumption Instantaneous Mileage	km/L	y = x/10

## Notes

This protocol will have more things added in future. Non-Haltech products on the same CAN bus may cause CAN bus ID conflicts when that happens.

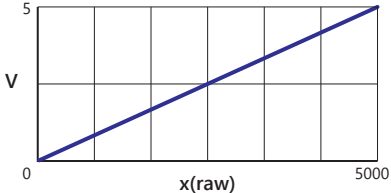
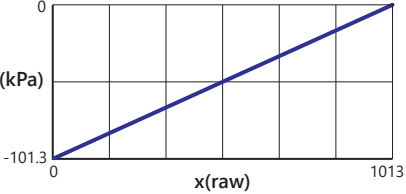
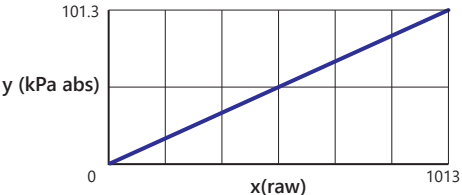
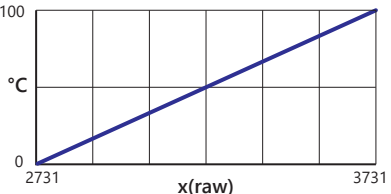
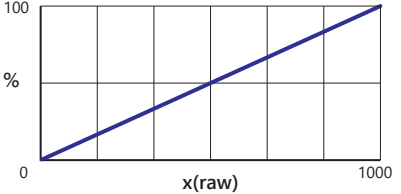
This protocol can change at Haltech's discretion (though we generally try to avoid it).

The rates specified above are not guaranteed.

# TRACTION CONTROL STATES

Traction Control State Channel	Raw	Enabled Bit	Active Bit	Light Bit	Notes
CAN ID		0x3E4	0x3E4	0x3E4	
Byte:bit		3 : 7	3 : 6	7 : 0	
Function Disabled	-1	x	x	x	Function disabled in the software
Idle	0	✓	x	x	Enabled, slip is currently less than target. Or Driven Wheel Speed is below Min setting.
Active	2	✓	✓	✓	Slip is greater than target slip. Action is being taken. - PID control style has an RPM limiter active - Cut Percentage style the cut percentage table is being obeyed.
Ramp Out	4	✓	✓	✓	After being Active, the PID controller ramps the RPM limiter up while in this state.
Disabled	5	x	x	✓	Disabled by the Traction Control Switch and/or Conditional Activation. Light bit is on to warn the driver that the traction control is inactive.

# GENERIC SENSORS

Sensor Type	Unit	Scaling	
Switch		0 = Off, 1 = On	
Voltage	V	$y = x/1000$	
Pressure	kPa	$y = x/10 - 101.3$	
	kPa (abs)	$y = x/10$	
Temperature	K	$y = x/10$	
	°C	$y = x/10 - 273.1$	
	°F	$y = x*0.18 - 255.372$	
Percentage	%	$y = x/10$	

Thank you for your support of Haltech Engine Management and our CAN based devices.