

AUTOMOTIVE TECHNICIAN TRAINING

DIGITAL UNIVERSITY PRESS

In association with:

BOSCH



Snap-on®

Free—training sessions



Several sessions have already been run and were all well received by the delegates.

However, if traveling to our offices in Essex is difficult, sessions can be run at your premises at very reasonable rates. Please email or telephone to discuss.

Training sessions cover issues such as:

- Program operation
- Lesson planning
- Database searching
- Playlist creation
- Office' document creation
- Skills gap assessor

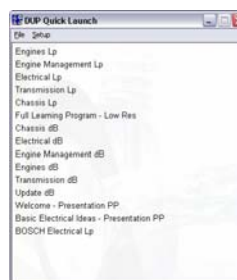
Many users are enjoying and getting a lot from ATT. However, there is so much to it that will save you time and effort that a training session (run by the author) is almost essential.

As a way of supporting this DUP are offering one free training place to each college or training company. Other members of staff are of course welcome at a nominal charge of just £95.

Free—launcher program

Recently developed, a small Launcher program can now be installed on to the computer. This then allows installation of Course material and other useful features. The Launcher program also acts as a convenient and customisable menu allowing easy access to

the course material. Download a copy from the web site or email and we will send you a copy—no charge of course!



Special points of interest:

- Free training
- DUP launcher program
- Racing plugs
- Team profile
- Controller area networks (CAN)
- Top tips

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Bosch spark plugs for motor racing



High performance plugs in use (Source: Bosch Press)

“Spark plugs in motor racing are exposed to special strains and stresses. In normal traffic, spark plugs are only driven under full load-conditions for about ten percent of the time “



Bosch spark plugs are not only fitted as original equipment into many automobiles, they are also very successful in popular motor sports events all around the world.

Bosch spark plugs everywhere decisively help winning – whether it's the German Touring Car Masters DTM or the 24-hour race of Le Mans, the 24-hour race at the Nürburgring, the Indy Car Series in the United States or the Rallye Paris-Dakar. Bosch spark plugs have even successfully passed the hard tests of Formula-1 racing.

Many of the racing sport spark plugs are customized special products, which differ greatly from commercial spark plugs in design and material. These specific spark plugs show great variation in size, thread diameter and length. In Formula 1, for example, some spark plugs have a length of only 50mm which is half the

length of standard spark plugs. Racing engines tightly packed with sophisticated engineering do not leave much space for spark plugs.

Aside from a special spark plug design, in motor sports spark plugs frequently have electrodes with platinum or the rare earth element yttrium.

Spark plugs in motor racing are exposed to special strains and stresses. In normal traffic, spark plugs are only driven under full load-conditions for about ten percent of the time of operation, in motor sports this is the case in up to 70 percent of the time.

The special performance of these special spark plugs comes at a high price: they may cost up to £125 each (2004). Since a set of spark plugs is sometimes only driven for one race, a team uses up to 4,000 of these spark plugs per season, which are made in small numbers and in special processes.

Spark plugs, together with coil, control unit and injectors, are components which may decisively influence the performance. This is why Bosch as acknowledged specialist for engine engineering frequently supplies

spark plugs with all the other components of the overall system of ignition, injection and engine management.

However, aside from the special spark plugs, sometimes standard spark plugs such as the Bosch Super with yttrium are requested in motor sports. They are, for example, driven in rallies or in one make cups such as the Porsche Carrera Cup and the Volkswagen Polo Cup.

Of the automotive manufacturers, Alfa, Audi, Honda, Lamborghini, Mercedes, Opel, Porsche, Skoda, Seat, Toyota and Volkswagen use Bosch spark plugs in various racing series. But many other private and independent racing teams also profit from this performance. Furthermore, the experience gathered – as is true for many components tested in motor racing – benefits also spark plugs for large volume production and maintenance.



Triple electrode plug (Source: Bosch Press)

Controller Area Networks (CAN) update

The Society of Automotive Engineers (SAE) defined three categories of in-vehicle networks. These categories are based on speed and functions:

Class A Multiplexing:
Low Speed (<10 kbit/s) for convenience features for example, entertainment, audio, trip computer, etc.

Class B Multiplexing:
Medium Speed (10 to 125 kbit/s) for general information transfer for example, instruments, vehicle speed, emissions data, etc.

The SAE J1850 standard was a joint effort among the 'Big Three' (Ford, GM and Daimler Chrysler). The resulting standard has two basic versions:

10.4kbit/s VPW (Variable Pulse Width) – which uses a single bus wire

41.6kbit /s PWM (Pulse Width Modulation) – which uses a two-wire differential bus.

Emissions legislation was a driving force for the standardisation of J1850. This was because some US legislation (CARB) required the implementation of diagnostic tools for emission-related sys-

tems. OBD-II specifies that stored fault codes must be accessible via a diagnostic socket using a standard protocol. OBD-II specifies J1850 and the European standard, ISO 9141-2.

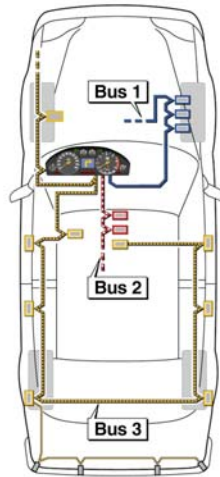
Class C Multiplexing:
High Speed (125kbit/s to 1Mbit/s or greater) for real-time control for example, powertrain control, vehicle dynamics, steer by wire, etc.

The two wires operate in differential mode, in other words they carry inverted voltages (to reduce interference). The levels depend on which standard is being used. The voltage on the two wires, known as CAN-High and CAN-Low are as shown in the table.

Benefits of in-vehicle networking can be summarised as follows:

A smaller number of wires is required for each function. This reduces the size and cost of the wiring harness as well as its weight. Reliability, serviceability, and installation issues are improved.

General sensor data, such as vehicle speed, engine temperature and air temperature can be



- Bus 1 Drive train bus**
e.g. Motronic
ABS/ASR/ESP
Transmission control
- Bus 2 Multimedia bus**
e.g. Main display unit
Radio
Travelpilot
- Bus 3 Body bus**
e.g. Parkpilot
Body computer
Door control units

shared. This eliminates the need for redundant sensors.

Functions can be added through software changes unlike existing systems, which require an additional module or input/output pins for each function added.

New features can be enabled by networking, for example, each driver's preference for ride firmness, seat position, steering assist effort, mirror position and radio station presets can be stored in a memory profile.

“The two wires operate in differential mode, in other words they carry inverted voltages (to reduce interference)”

Signal	recessive			dominant		
	min	nominal	max	min	nominal	max
CAN-High	2.0V	2.5V	3.0V	2.75V	3.5V	4.5V
CAN-Low	2.0V	2.5V	3.0V	0.5V	1.5V	2.25V

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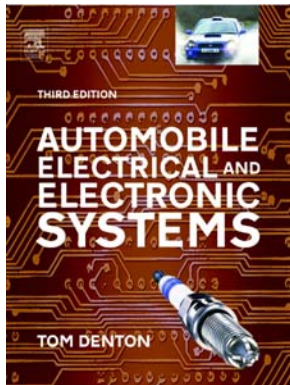
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Working with world class automotive companies DUP has a substantial training resource that comprises over 7000 screens of learning coupled with a 1500 page workbook, 10,000 image database, 300 worksheets, and 1,500 randomly generated multiple-choice questions. Having control over this intellectual property allows DUP to be bespoke and re-brand but, most importantly, respond to clients in a timely and cost effective way.

DUP is owned principally by Mark Pitman of Pitman Publishing, Pitman Training and Bath Press. Alan Church is the managing director of DUP with the technical team being led by Tom Denton the UK best selling automotive author.

Author profile



One of Tom's best selling books 'Automobile Electrical and Electronic Systems' is now in its third edition

Tom Denton

After an army apprenticeship and a career that evolved from being 'on the spanners' to owning a retail garage, Tom moved into teaching at a large FE college in 1988. He started writing his first book, Automobile Electrical and Electronic Systems, in 1992 and this was first published in 1995. His impressive publications list now includes several other titles including: Motor Vehicle Engineering: Levels 2 and 3, and Advanced Automotive Fault Diagnosis. He has also published books in the USA.

Tom is a consultant for City & Guilds and has also done work for the IMI. In this way he stays in touch with the qualifications and associated developments.

As the senior author of Automotive Technician Training, Tom's experience in industry, training and writing has really paid dividends. If you are not already using it, to do much of your work, then at least take a look—it will be worth it!

Automotive Technician Training

A decorative graphic consisting of two crossed flags (checkered racing flags) positioned between two sets of horizontal lines that curve upwards at the ends.