

High Voltage Fault

This article is a true description of a problem presented to our technical support team

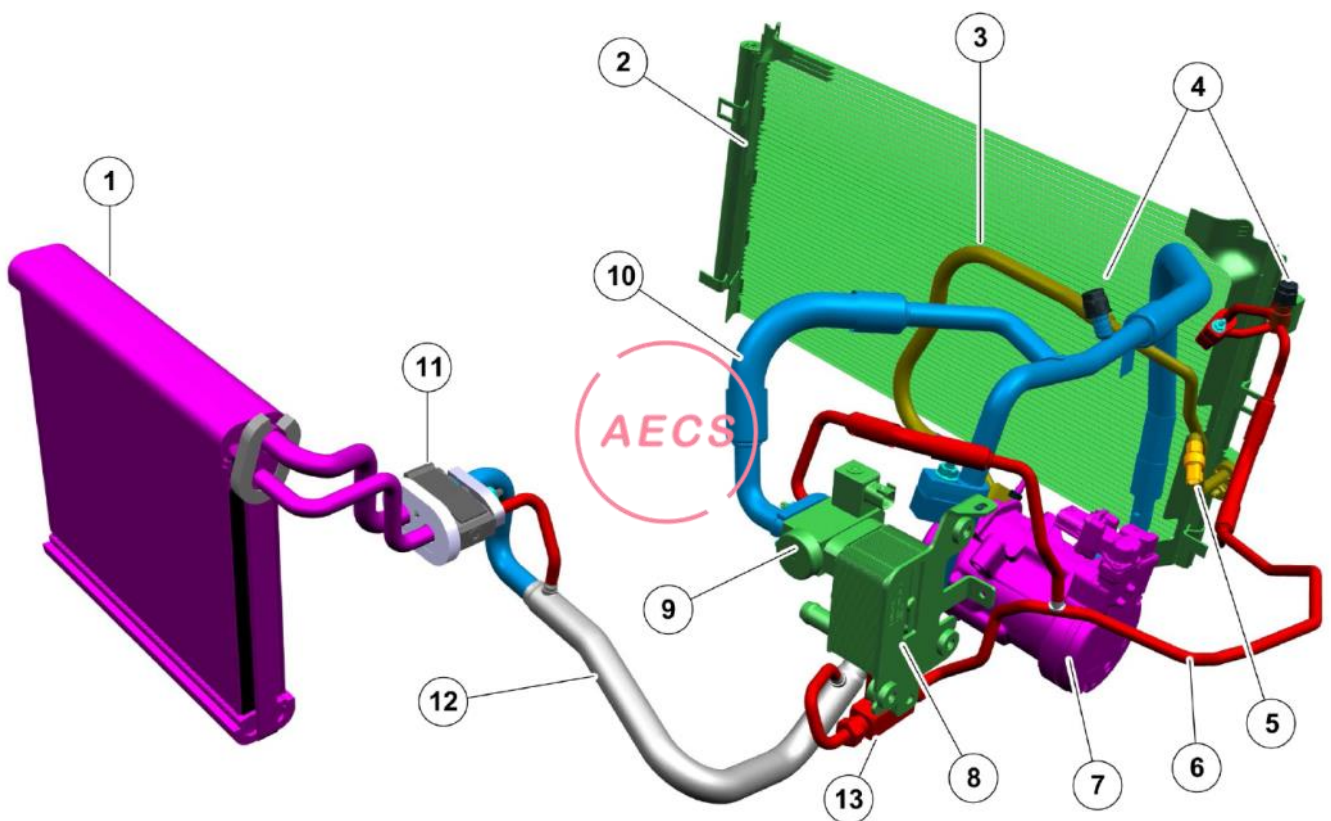
Vehicle

High Voltage EV Aircon system. We can not be more specific as the case is still under financial review/strain.

Problem presented to the technical support team

The aircon system on this late model EV has stopped working and has shut the car down.

The AC system cools the High Voltage battery and the passenger compartment. Below is a picture of a system like that of a 2020 Ford. I am stressing that the troublesome compressor was NOT from a Ford:



The picture of this system shows how the High Voltage compressor (7) pumps refrigerant into the condenser, from where it travels in liquid form to the battery coolant heat exchanger (8) and the IHX (12). Obviously when the compressor stops (with fault codes) the battery cooling comes into jeopardy. That is why the vehicle shuts down.

What are the dangers for you?

Where the workshop that worked on this late model EV stepped into, is that the refrigerant was removed and refilled as work had to be done to the front of the vehicle. The workshop got their regular refrigeration contractor in to do the job. "An AC system is an AC system after all". Right??

Conductivity

Inside the compressor are exposed high voltage windings and tracks, we warn about this, and show this during the High voltage Aircon training seminars we run.

- Refrigerant is not conductive.
- Regular PAG oil as used in all belt driven systems is conductive and hygroscopic (attracts moisture).
- POE oil is not conductive
- Many manufacturers warn that 1% of oil contamination in a High Voltage Aircon system permanently damages the system, resulting in full replacement of all Aircon parts.

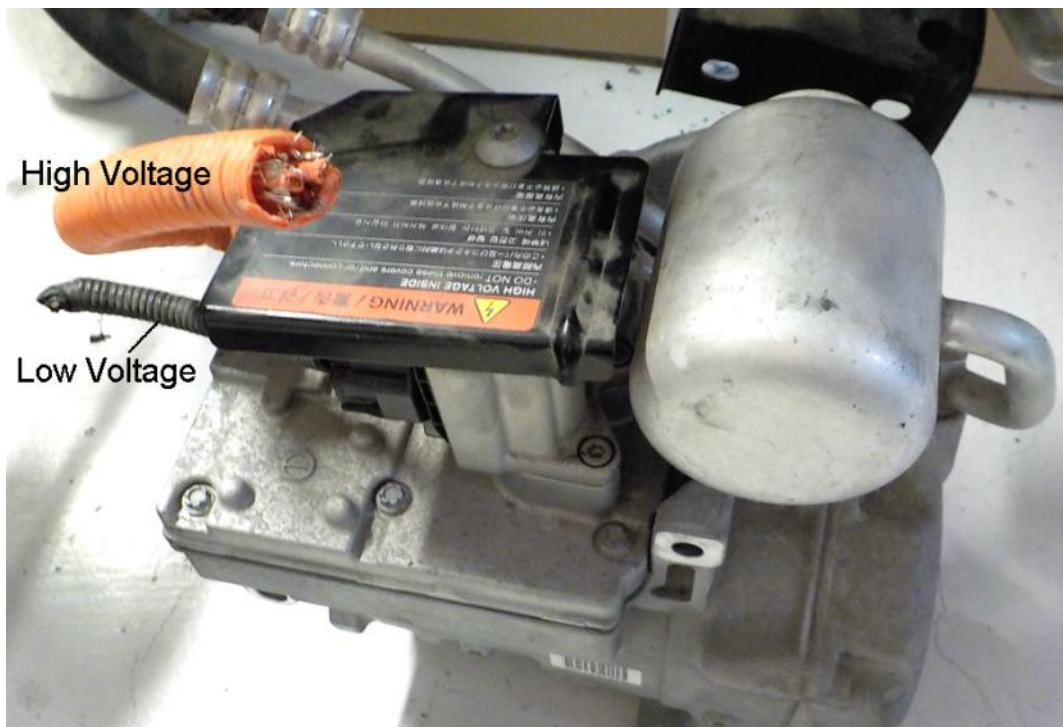
How does this work?

To understand why contamination with PAG oil or moisture is a problem you need to know how the compressor works.

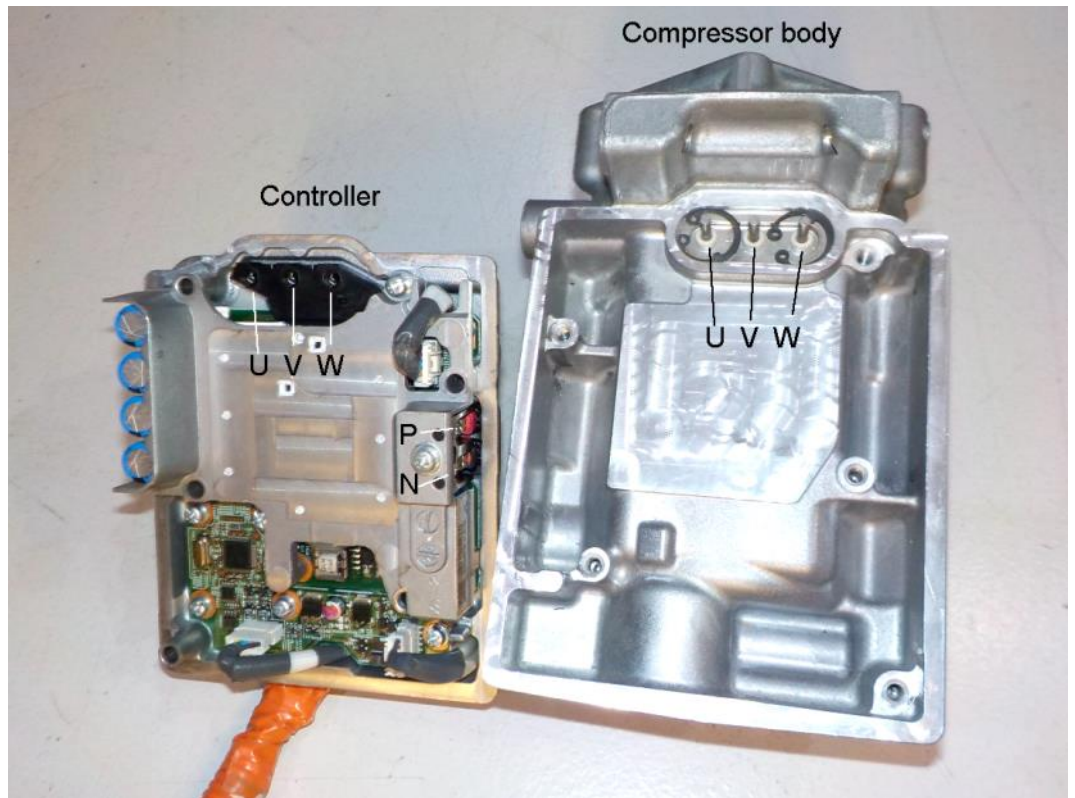
Firstly the flow of refrigerant in many HV compressors is that the cold gaseous refrigerant passes over the high voltage motor's windings, to cool the motor windings.

The refrigerant gets drawn into the scroll compressor from the motor's housing.

After the compression takes place the refrigerant flows to the condenser.



Nissan Leaf HV compressor. (picture from the ECAC1-2 training manual)

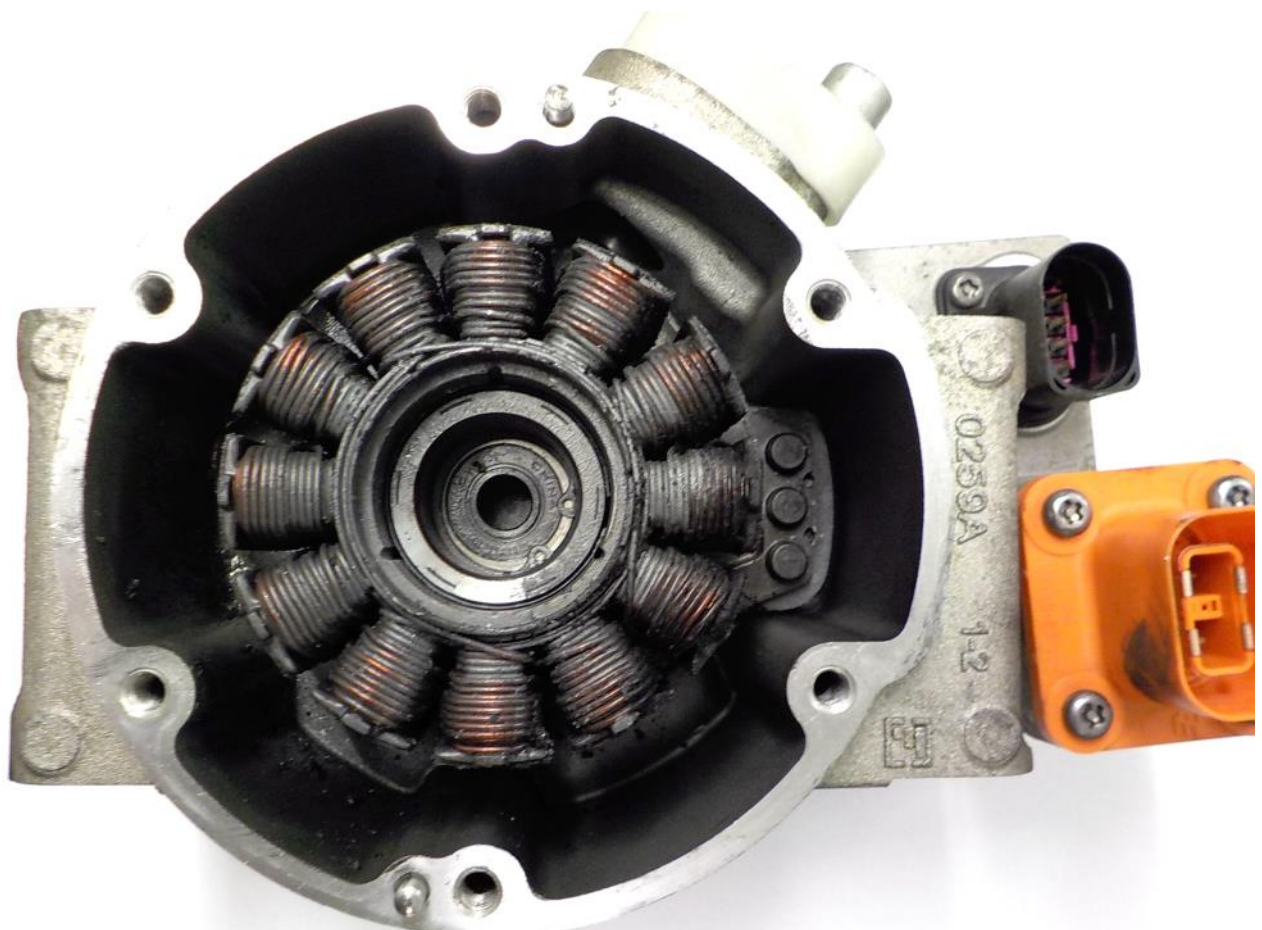


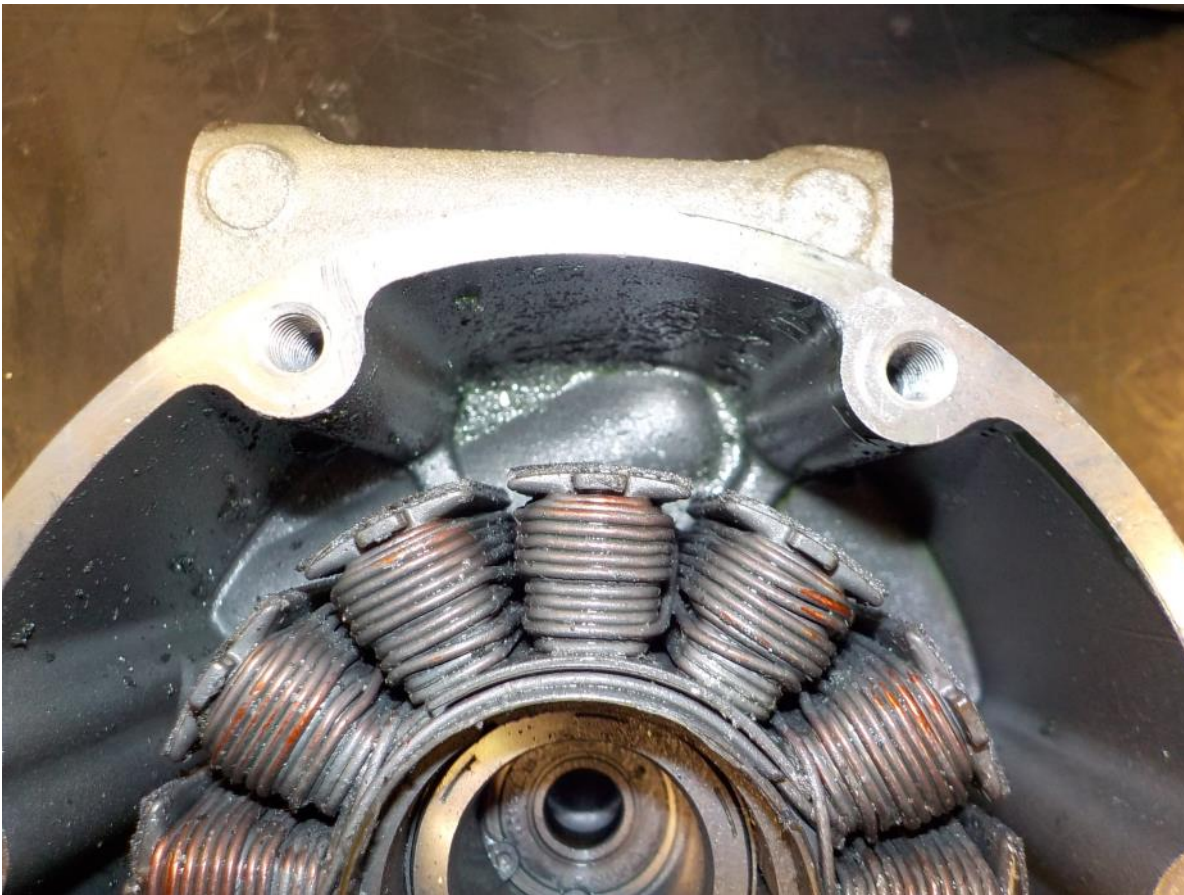
Compressor open. (picture from AECS ECAC1-2 training manual)

Short circuits

So what happens if the refrigerant contains PAG oil and /or moisture and passes over the windings and exposed terminals?

A picture is worth a 1000 words:





Zoomed in on the winding you see what is going on.

Please see in the above picture the debris in the compressor motor's housing coming from the coils' insulation after the short circuit burned through the insulation. That debris gets drawn into the scroll compressor where the tolerances are super fine.



Compressor's dynamic scroll.



The static scroll of the compressor

The debris made in the scroll (during self destruction), passes through the valves.



The debris found its way into the condenser and eventually into the rest of the AC system .



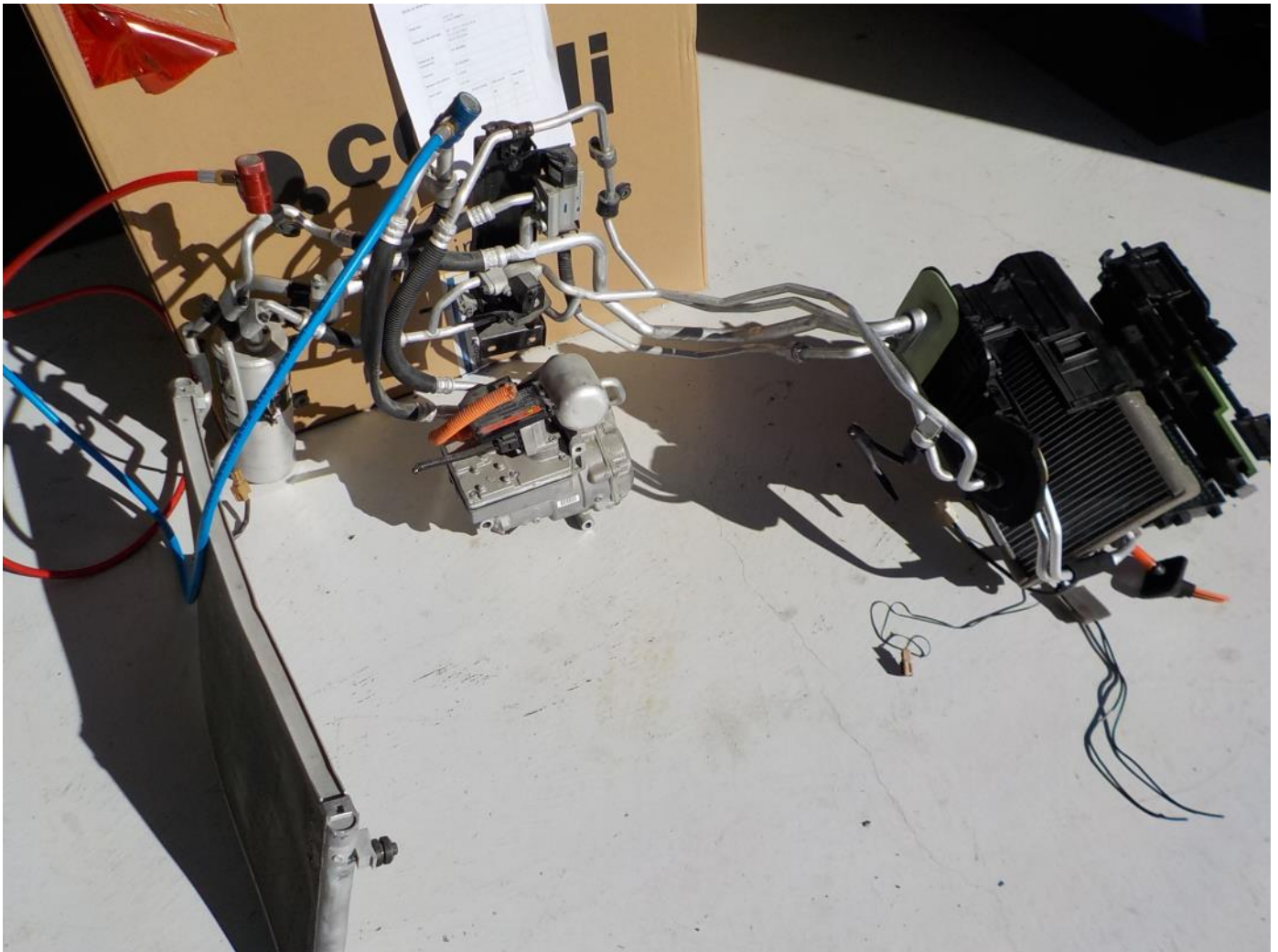
New compressor

Fitting simply a new compressor does not fix anything, as the PAG oil and filings are still distributed throughout the system eventually entering the new high voltage compressor again.

Who is going to pay for this complete replacement of all parts? We are talking MAJOR work and costs here!

Prevention is the best insurance.

How can you prevent problems like this? Well, that is rather simple. In the ECAC1-2 High Voltage aircon training we spend a fair bit of time on this subject besides explaining how heat pumps actually work on high end vehicles.



Nissan Leaf heat pump system as presented and diagnosed during the AECS training.

During the training we explain how the Brainbee/Mahle's aircon service machine deals with preventing contamination of conductive oil in High voltage system step by step. I am a great believer of that you need to know what your tools are able to do, and how they achieve their goals. I also prove that the automatic change over from servicing belt driven system to High Voltage system actually works in a proper machine. Unlike the equipment used in the AC system with the damaged compressor in the pictures above.

There is likely going to be lawyers involved in this case, this is why I can not reveal anything identifying.



Conclusion

Please STOP believing that an Aircon system is just an Aircon system!! The fact that a High Voltage system has service ports to which any Aircon service equipment can be connected is a wide **open trap door**, please believe me.

Invest in training and proper equipment that actually is designed to do the job properly like the Brainbee/Mahle range of equipment.

AECS Aircon service

Equipment and consumables for R134a / R1234yf, High Voltage and Traditional AC systems

BRAINBEE 9350
\$9,820+gst

FULL RANGE OF AC ACCESSORIES

Both the Brainbee 9350 (R134a) and the Brainbee 9450 (R1234yf) are capable to switch seamlessly and automatically over from traditional AC systems to high voltage AC systems via a patented system. No trace contamination.

For **AECS** Ltd
Herbert Leijen
Trainer/Research
www.aecs.net

AECS
AUTOMOTIVE EQUIPMENT & TRAINING
06 874 9077 | INFO@AECS.NET | AECS.NET

Special offer

Take the benefit of a brand new car scantool kit with 3 years worth of updates for:

\$4229+gst

Offer includes (free) **Launch BST360** and **TSGUN (lite)**

Note: Until stocks lasts



AECS
AUTOMOTIVE WORKSHOP EQUIPMENT

LAUNCH
AUSCAN 3

PHONE: 06 874 9077
EMAIL: info@aece.net
WEB: www.aecs.net

AUTOMOTIVE EQUIPMENT | TRAINING | TECH SUPPORT

AUSCAN 3
WHAT'S IN THE BOX

CONNECTORS
Full range of connectors. Connect to older and the latest vehicles, including 125+ brands.

AUSCAN 3
All day battery - 7000mAh
Huge storage - 32G+32G SD
Large screen - 10.1" LCD
Dust tight - IP65
OS - Android 9

OBD CONNECTOR
Bluetooth + Extension

TOUGH CASE

AECS AUTOMOTIVE EQUIPMENT & TRAINING
LAUNCH AUSCAN 3
The new AUSCAN 3 is a dynamic tool, with impressive vehicle coverage and full system diagnosis, it's the must have tool for every workshop.

FEATURES:

- Scans 125+ brands, each vehicle fully covered
- Re-programme modules, code injectors and keys, fast live data and accurate graphing
- Print/email reports directly from the AUSCAN 3 to your customer
- Code troubleshoot and guides accessible directly from the scan tool
- Easy 1 click updates (24 mths included)
- AECS technical support database directly from the tool (optional)
- 12-months AECS technical support (optional)

SPECIAL FUNCTIONS:
AUSCAN 3 has a huge ability. Includes special functions such as:

- Immobilizer/key coding
- Electronic throttle relearn
- Door control re-learn
- ETACS adapt
- Transmission re-learn
- Actuator tests

Resets include:

- SAS
- Oil
- DPF
- TPMS
- Brakes
- Battery
- Brake bleed
- Throttle relearn
- Injectors
- Immobiliser
- Transmission (and many more)

Additional features:

- All day battery - 7000mAh
- Huge storage - 32G+32G SD
- Large screen - 10.1" LCD
- Dust tight - IP65
- OS - Android 9
- OBD Connector Bluetooth + Extension
- Full range of connectors. Connect to older and the latest vehicles, including 138 brands
- Auscan 3 has ADAS installed ready for when you want to expand into ADAS calibration

This is the real Launch for New Zealand

AECS **BST360**
WHAT'S IN THE BOX

BATTERY ANALYSER

\$ 169.50+gst

The Launch BST360, is a quick and easy to use battery, charging system and starting system analyser.

Bluetooth is connectable to any Launch android tablet, mobile phone, or tablet that you may wish to use. The accompanying app can be installed on multiple devices, with no complex registration is needed.

Are you doing vehicle inspections with a tablet at hand? Why not add a PDF report about one of the more troublesome parts of the car? A comprehensive battery report is created in less than 30 seconds.

You can create a report when the car is in for just simple maintenance.

Tech details:

Connection method: Bluetooth

Applicable for: 6V/12V Lead-acid, GEL and AGM battery systems.

Supported battery standards: CCA, BCI, CA, MCA, JIS, DIN, IEC, EN, SAE, GB

Measurement capacity range: 30AH – 80 AH

Working temp: -10°C +60°C

No internal batteries are required, the tool powers up from the car battery.



BLUETOOTH THROUGH YOUR SCAN TOOL



AUSCAN 3



EUROTAB 3



AECS **TSGUN**
WHAT'S IN THE BOX

TPMS SENSOR ACTIVATOR

The Launch TSGUN is a Tyre Pressure sensor wand (activator) for TPMS systems on most cars.

Bluetooth is connectable to any modern Launch android tablet that has the TPMS function integrated.

- The Lite version is the tool as illustrated.
- The Pro version comes with 4 durable aluminium tyre valves.

Tech details:

Connection method: Bluetooth

Applicable for: 315MHz and 433MHz valves (most common systems)

Easy to use when installed correctly.

Activate tyre valves when the vehicle sits idle in the workshop to teach locations and to test battery and actual tyre pressures. Can also be used to activate OEM sensors.

Position	Valve ID	Frequency	Pressure	Temperature	Status
FR	CE181233	433MHz	29	240	Normal
RR	CE181BE3	433MHz	29	274	Normal
RL	CE181BE7	433MHz	32	259	Normal

Lite \$ 392.10+gst
Pro \$ 492.10+gst

BLUETOOTH THROUGH YOUR SCAN TOOL



AUSCAN 3



EUROTAB 3



DID YOU KNOW ??



Merger affecting training

You may be aware that MITO and the Polytechs have merged as a result of government policy.

This has the following consequence:

AECS has been delivering the NZQA accredited EV/Hybrid training for MITO as a result of a partnership we built in 2018. This partnership has now come to a friendly end.

All trainees that come in through the old MITO channels will be guided towards the Polytech EV training as a direct result of the merger.

Make sure you get what you expect!

It is important to know that the Polytech training seminars and the **AECS** training seminars are two completely different products.

Without down playing the value of the Polytech training, **AECS** has been and still is making training content, based on research and practical problems from field experience and our engineering background.

If you have been to one of our training seminars, enjoyed it, and would like to learn more with **AECS**, do not expect the AECS training if you book through the MITO channels, instead from now on please book through us direct.

So what is different?

We are still delivering our highly practical and energetic seminars throughout the country, with one difference: You will not get an NZQA diploma at the end of it, but as per normal the highly recognised **AECS** certificate.

Scroll through our training calendar, or even integrate it with your own calendar <https://aecs.net/trainingdates/>

Enrolling (or just to have a chat) is easy:

Web: aecs.net

Email: info@aecs.net

Phone: 06-8749 077

Post or Visit: 897 Valley rd, Hastings

We hope to see you soon!

Kind regards,

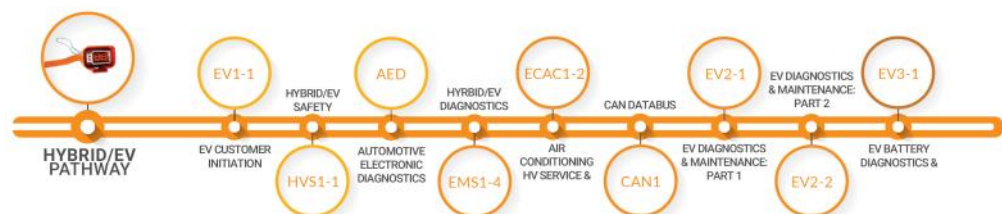
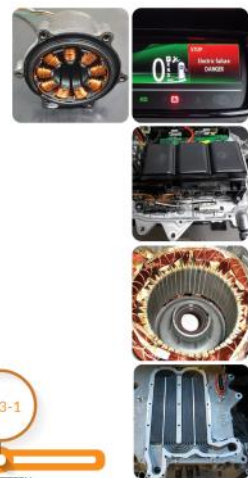
Herbert Leijen



AECS
AUTOMOTIVE TRAINING

Accredited EV Specialist

Presented to :



Accredited electric vehicle technician has studied and shown competence in:

- HV Li-ion battery diagnostics and repair.
- Customer behaviour guidance, to ensure HV battery longevity.
- All regular maintenance aspects on EV's and Hybrids.
- Working with, diagnosing, and repairing High Voltage electronics on Hybrid and Electric Vehicle technology.



AECS
AUTOMOTIVE EQUIPMENT & TRAINING

Herbert
HERBERT LEIJEN
DIRECTOR

MEMBER OF
YES
Your Electronic Specialists
AUTOMOTIVE EQUIPMENT & TRAINING