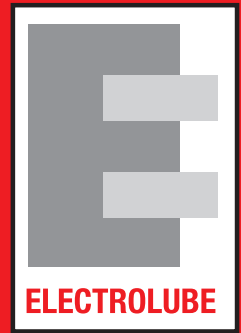


Clean, Protect, Lubricate



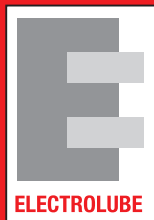
Specialist Lubricants



www.electrolube.com

Lubricants for Automotive Applications

Electrolube has a long history of manufacturing specialist lubricants and chemicals for the **Electronics, Automotive, Aerospace, Communications and Utility Industries.**



60 years ago Electrolube developed specialist oils to reduce contact wear and improve electrical efficiency in switches; these oils and greases through continual technical development and testing programmes have become an industry standard. Electrolube contacts and damping contact lubricants are used by automotive manufacturers to

ensure many years of fault free service, from the smallest mass produced family sedan to the worlds' most exciting supercars and the latest hybrid electric and electric vehicles. Electrolube are actively researching new technologies, and are persistent in the progression of the range to include new materials for the ever advancing automotive market, particularly where higher specifications and greater challenges must be accomplished.

The Electrolube philosophy of quality and efficiency extends through the entire range of products including; the comprehensive range of Conformal Coatings, Potting and Encapsulating Resin Systems and Heat Transfer materials, that have been developed to meet the exacting demands of the Aerospace, Military, Medical, and Marine Industries. MIL-Spec and Defence Standards form the basis of product requirements, including but not limited to the resistance to solvents, sea-water, humidity, vibration and pressure. Such products are designed for ease of use and are manufactured to a consistently high level of quality, meeting both the demands of the customer and the values laid down in the Electrolube philosophy.



Car owners increasingly expect minimal noise and smooth continuous operation of control elements in their vehicles. They also expect innovative ideas regarding comfort and safety and lower costs with regards to service and efficiency. It's no surprise that automotive leaders have been making huge strides in achieving these requirements and it's due to such customer expectations that automotive manufacturing has developed so rapidly in such a short period of time. There is a general trend towards vehicles that consume considerably less fuel, or use alternative fuels or methods of energy production either way, this is going to revolutionize automotive manufacturing for every single component in the modern automobile.

Electrolube's automotive lubricant product range helps engineers meet huge demands faced on a daily basis. Engineers are under pressure to keep costs down by the correct selection of materials in combination with complex, innovative designs. The development of Electrolube's lubricants, together with leading automotive manufacturer's, has led to materials with improved high and low temperature performance and improved resistance to the external environment, chemicals and substances, as well as enhanced performance when subjected to mechanical influences such as shock, vibrations and heavy loads. In addition, they are compatible with the most sensitive of plastics and are continually reviewed to meet the latest environmental requirements.

Damping Lubricants

The most important role of lubricating greases is to protect from wear and corrosion. Damping lubricants are materials which economically control free motion and noise in mechanical components whilst giving a "quality feel" to hand operated mechanisms. For current carrying metal interfaces, the major advantage is that they increase the reliability and lifetime of these components by preventing corrosion and wear, which could include sensors, switches, potentiometers and connectors, for example.



Connectors - Automotive Electrical Systems

Contact lubricants are used extensively for connectors

Connectors in early automotive applications were plagued with "fretting corrosion" problems. Why static contacts (connectors) suffer from mechanical wear may not be immediately obvious, however. This phenomenon is explained by the fact that connectors and closed contacts are exposed to small amplitude movements caused by vibration and temperature changes, for example. These small movements are known as 'fretage'. As the surfaces fret, friction causes metal particles to be removed from the higher points on the surface of the connector, breaking through plated surfaces. This exposes surface and underlying metal to effects of oxidation and wear. Additionally the detached metal particles can cause intermittent signal transmission and ultimately switch failure.

A lubricated switch is subject to far less mechanical wear as the lubricant facilitates smooth movement. Friction is therefore greatly reduced, as is wear, extending switch lifetime and electrical efficiency. Such improvements are extremely important in the challenge of meeting the energy efficiency requirements of today's more fuel economical and hybrid/electric vehicles.

Although tin and silver plated contacts are more commonly used, gold plated contacts are also apparent in some connector designs. Gold is a soft material and can exaggerate fretting corrosion. Again, the use of the correct contact lubricant can solve these inherent problems, making a wider selection of materials available.

Automotive manufacturers also have to take into account the forces required for insertion and removal of connectors. In difficult to reach areas, such as under bonnet applications for example, forcefully removing connectors could amount to connector damage or personal injury. Contact lubricants, especially fluoroether based lubricants have an exceptional ability to reduce insertion forces.

Switches - High Current Arcing Switches/Contacts

As un-lubricated contacts open and close, arcing (mini lightning strikes) can often occur.

Arcing is destructive as it generates heat, causing oxide formation, and as the amount of energy is high, corrosive by-products can be formed. These cause corrosion of the surface and can destroy plated contacts.

Ionisation of the air and the associated rise in temperature causes metal transfer between the contacts, resulting in the formation of new 'peaks and troughs' - a common problem found in high power contacts.

The problem of arcing is compounded in 'make and break' switches where every time the circuit is opened, the contacts may bounce several times before finally mating. This exacerbates the problems discussed previously and subjects the circuit to repeated surges of current giving a poor signal to noise ratio.

This problem is not found in lubricated switches, as the lubricant fills the air gap between the contacts, preventing arcing, related temperature rises and corrosive chemical formation. As air is excluded from the metal surfaces, airborne contamination cannot form insulative barriers on the metals. Contact lubricants provide a cushion between the contacts to damp the effects of bouncing.

Medium Current - Switches / Contacts

These types of switches vary in design parameters and materials usually employed.

Typically more sensitive plastics and elastomers are used and the material must be compatible with these.

Microscopic examinations of contacts reveals 'peaks and troughs' on the surface and then when the contacts come together, only the peaks are actually touching. The true current carrying surface area is therefore far smaller than it would appear.

As the current is carried by a fraction of the designed surface area, the heat generated is concentrated at the peaks. This, in turn, causes the formation of high resistance oxide layers. As the resistance increases, more power is converted into heat leading to further oxidation.

This spiralling effect creates 'hot spots' reducing the efficiency of the switch and, over time, can cause complete failure as the two surfaces weld together.

Application of an Electrolube contact lubricant solves this problem. The lubricant film dramatically increases the effective surface area as, when applied in thin films, the lubricants allow the passage of electricity whilst filling in the gaps created by the uneven surfaces. The switch now has the surface area that the designers planned, 'hot spots' are eliminated and the contact resistance remains low and stable.

Product Recommendation

Connectors

Gold Plated Contacts
Air bag connectors/assembly
Clock Springs
CG60, EG2F

Multipin Automotive connectors
High insertion force
CG60, CG70, EG2F

Slip Ring devices
EML, SOB

Tin plated connectors
CG60, CG70

High Current Arcing Switches/Contacts

Starters/Ignition, Headlamps
and High Beam
CG53A, HVG, SGB

Turn Signal switches
G71, CG60, SGB

Heating and Ventilation
CG71, SGA, SGB



Medium Current Switches

Windscreen Wipers
CG71, CG60

Rear Window defroster
CG70, CG60

Power Window switches
Power door switches
CG60, CG70, EG2F

Fan Speed/Speed
control switches
CG60, CG70, CG71, EG2F

Sliding Roof/Sun Roof
CG60, CG71

Break Light switch
CG60, CG71

Central Locking switches
CG60, CG71

Power Mirror switches
CG60, CG71

Power seat switches
CG60, CG70

Hazard Warning Switches,
Horn Switches
CG60, SGB

Tailgate/Trunk switch
Hood Switch
CG60, CG71

Relay's, Micro Switches
CCS, EML, CO70

Low Current - Carrying Switches / Contacts

Low current carrying switches and contacts are typically made with the most sensitive plastic and elastomer rubbers, yet being low current carrying, demand the best electrical performance from contact lubricants.

Electrolube's contact lubricants have been used extensively for High Quality Audio applications and ergonomic controls. The application of lubricants prevents corrosion of the metal interfaces, whilst providing the switch with very low levels of electrical noise and very stable signals.

Sensors and Potentiometers

Potentiometers require low viscosity base oils, coupled with an effective, non-carbonising thickener.

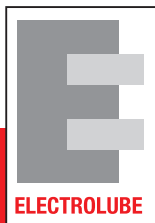
Potentiometers have low contact forces and must stay in contact with the resistor; a high viscosity grease would not allow close contact with the resistor. Fluorinated greases have exceptional plastics compatibility and solvent resistance.

Interior Components

Lubricants for Non-Electrical Automotive Applications

Interior components requiring lubrication come in many combinations, for example, metal/metal contacts (seating tracks, sunroof tracks, etc), plastic/plastic (windscreen wiper gears, window visor, cup holders, grip handles, etc) and plastic/metal contacts (cables, glove compartment locking mechanisms, etc).

Each application requires a certain grease characteristic to provide damping of free movement and noise as well as providing a quality feel. Electrolube's damping Lubricants offer engineers an economical route to quality.



UK Headquarters / Manufacturing

Electrolube UK
Kingsbury Park
Midland Road
Swadlincote
Derbyshire DE11 0AN
United Kingdom

Tel: +44(0) 1283 222111
Fax: +44(0) 1283 550177
Email: info@hkw.co.uk



China Office / Manufacturing

Electrolube China
Building No.2, Mauhwa Industrial Park,
Caida 3rd Street, Caiyuan Industrial Zone,
Nancai Township, Shunyi District,
Beijing, 101300
Peoples Republic of China

Tel: +86 (10) 89475123
Fax: +86 (10) 89475077

Product Recommendation

Low Current Switches and Contacts

Low current Switches
Light Switches, Audio switches
Micro switches

CG71, LCG, CO70

Low contact pressure switches
SOA, CG71, CO70

Steering wheel switches
Ergonomic Switches

CG60, CG71

Redundant Controls
CG60, CG71

Sensors and Potentiometers

A low viscosity grease is recommended for these applications with excellent low temperature properties

EG2F, DOF, CG71

Fuel Level Sensors
EG2F, DOF

Electronic throttle motor
EG2F, CG60

Battery Contacts
CG71, HCG

Medium - Heavy Viscosity Lubrication

SPGA, EGF

Light Viscosity Lubrication

Cup Holders, Ash Tray
Grip Handles

SPG

Glove box compartment locking mechanisms, Sunroof mechanisms, Seating mechanisms, interior ventilation air flaps, cup holder

SPG, SCO

Ashtray mechanism head rests, mirror adjustments bowden cables, wiper systems interior systems, linear motors locking systems, door modules etc

SPG, SCO

Electric Seat Transmission
CG60, CG70

Sunroof Mechanisms
SPG