FCPP

PLATINUM SHIELD PROTECTION

# CORROSION CONTROL MODULE

## ADVANCED TECHNOLOGY for TODAY'S CONSUMERS

**Why use FCPP's module:**

+ Quick & Easy installation
+ No drying time vs. traditional applications (Spot deliveries)
+ No special bay required
+ No chemical odor or mess
+ Environmentally & workplace friendly
+ Protects areas that conventional products can't (inside seams, roofs, external sheet metal, etc)
+ No touch-ups or re-application required
+ Portable (transfer to next vehicle - ideal for lease customers)
+ Latest technology (customers are into technology / advancement)
+ Total inventory control (unlike kegs or bottles... one module per vehicle... simple)


## TESTED & PROVEN TO WORK!!

**Scientific Testing**

- ✓ **CC Technologies**
- ✓ **Smithers Scientific Services**
- ✓ **Underwriters' Laboratories of Canada**
- ✓ **Ohio State ElectroScience Laboratory**

World class independent labs have performed tests to study the effectiveness of using this module on automotive sheet metal in various conditions…

the results show a reduction in corrosion by up to 99.7%.

**A NEW STANDARD ABOVE AND BEYOND OTHER ELECTRONIC MODULES**

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## Frequently Asked Questions

**1. *Will the Module affect or interfere with my radio reception?***

No, it will not. The circuitry is designed to comply with current EMC, CE & C-Tick standards. Therefore, you will not notice any unwanted static or interference.

**2. *Will I get a shock every time I touch my car?***

No, not at all. The unit delivers a "pulse" surface current and will not be felt when you touch the vehicle.

**3. *Will the module effect anyone with a pacemaker?***

No, it does not. The module does not emit any kind of signal or charge that would interfere with a pacemaker.

**4. *How do I know if the unit is working?***

There is a little red LED light built into the module. This light stays on constantly to show that the module is operating normally. If the light is off, it can mean a couple of things: 1) The battery has dropped below 12.1 volts. The module's light is designed to shut off at this voltage to save battery power for cold weather starting. The light will come back on when the battery voltage is above 12.6 volts (when the vehicle is started up). 2) If your light stays off constantly, you may have a battery problem, or the module may need to be replaced. (Return to your selling dealer for service).

**5. *Will this device drain my car battery?***

The module is constructed with "smart circuitry" It draws only about 10 mili-amps of power from your battery. The unit will automatically detect a drop in battery voltage below 12.1 volts and is designed to turn itself off to avoid battery drain. If this should occur, the module will automatically turn itself back on when you start your car.

**6. *What do I do if the red light on the module is off?***

Usually nothing. The module will shut itself down only if your car battery drops below 12.1 volts. This usually occurs in very cold weather, and when your car has been sitting idle. In these circumstances, the negative ion loss on you vehicle (which causes rust) is very minimal. The worst time of the year for oxidation or rust on your car is in the spring, summer & fall.
(note: if the module light is not operating when your vehicle is running, then return to your selling dealer for service.)

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### How Does It Work?

The Corrosion Control Module draws a small amount of DC energy from the vehicle's battery and directs it through a microprocessor, which converts this energy into an AC current.

Through patented state of the art technology built into the Corrosion Control Module, a pulse amplifier (another microprocessor) generates a repetitive "pulse" surface current, which is distributed on to conducting (grounded) body panels of the vehicle (travels on the surface of the metal) to help inhibit the corrosion process (slows down the oxidation process).

Metals want to turn back to their original state of iron oar… the oxygen molecules in the air steal negative ions from metals. Corrosion is an electro-chemical reaction. Iron and oxygen have opposite charges and therefore seek to combine to form rust. The metal body tends to have a positive electrical charge in an area where rust is occurring. In order to inhibit rust, the corrosion control module induces a negative charge to the surface, creating a force of repulsion. The pulse currents interferes with the corrosion process. (The surface current that the module produces slows the corrosion process down. Nothing stops corrosion and you should never say that this unit does either).

Being energy efficient, the Corrosion Control Module is built with "Smart Circuit" technology to insure that when the battery voltage is low, you are not put into a "no-start" situation.

The Module is mounted in the engine compartment of the vehicle with a velcro pad and is powered by the existing 12 volt car battery. Actual size of the module is 8 cm x 5.5 cm x 2.2 cm. Grounded body panel to create surface flow.

Externally fused to protect the unit from power surges, the Corrosion Control Module has been tested to exacting standards by world-renowned certified testing laboratories.

TESTING

## CC Technologies

Dr Digby Macdonald – Professor of Materials Science and Director, Center for Electrochemical Science and Technology @Penn State

Performed 3 experiments, on 3 occasions, using 3 different sets of panels:
- 2 standard automobile stock galvanized steel panels (48" x 36")
- one side painted with Dupont auto paint and clear-coated
- panels scribed to cut through the clear, paint, and galvanized layer
- reference electrode was placed at the location of the scribes to monitor corrosion
- one panel was connected to the test panel
- both panels were inclined at 25% to vertical, scribed surface facing outward
- scribed areas were continuously sprayed with 3.6 wt% NaCl (Salt) solution, the rest of the panel was dry (distance from spray area to module was approx 24")

### Results

- both panels remained about the same for the first 60 hours
- then panel with the module became more negative by 150 mV
- this significant difference in corrosion continued until the experiment was terminated (550 hour of exposure)

The effect of a 150mV difference in potential on the rate of corrosion of an automobile body panel is significant and may be determined by applying the following formula, which is derived from electrochemical kinetic (Tafel) theory:

$$CR = (CR)o\exp(aFEcorr/RT)$$

CR is the corrosion Rate, (CR)o is a constant, a is the transfer coefficient, F is Faraday's constant (96,487), R is the universal gas constant (8.314 J/K.mol), T is the Kelvin temperature (298.15 K), and Ecorr is the corrosion potential.

To **put these numbers into perspective**, imagine that a system (automobile) fails by corrosion **without a module in a time of one year**. If the module were attached, the failure tme would be **343 years** if the potential is displaced by **150mV** and **49 years** if it was displaced by only **100mV**
- module appears to reduce the rate of corrosion by limiting the passivation of the zinc galvanizing, therby enhancing the efficacy of the galvanization in protecting the steel
-unlike impressed current cathodic systems, the module's effect is not limited to the region where continuous electrolyte film exists between the point of application of the signal (the anode) and the area being protected. Rather, similar to an antenna, the current from the module covers the entire surface.

## Smithers Scientific Services

Exposed humidity and heat aging,
- 4 painted metal panels (84" x 15"), galvanized on both sides
- zinc chromate R-M DP20, then DP Auto Primer (base coat), then Base Coat Clear Coat, then placed in a spray bake booth for 20 minutes @ 160 F
- variety of scribe marks exposing the bare metal
- placed into a sealed chamber and monitored daily to verify that humidity, temperature, and voltage conditions stayed within their actual specified ranges. (humidity 95% =/- 2%, temperature 100 F =/-3 F, voltage 13.0 +/- .5 v)
- every 7 days the sheets were removed to be evaluated.
- test was stopped after 800 hours (week 5)

Results

The test panels affording manufacturers double-sided galvanizing protection showed a marked degree of sever corrosion and rusting when compared to the electronic corrosion control module. Scribes protectd by the module were nearly corrosion free. test was performed 3 different occasions with the same results

## Underwriters' Laboratories of Canada

- 6 pre-painted metal test panels (48" x 48") double galvanized sheet metal (dry passive galvanneal per Chrysler MS-6000 specifications), all washed, sanded, degreased, e-coat etch primer on both sides o panels, then Dupont Premier auto primer (base coat, then Dupont Clear coat was applied to one side of each panel, and baked for 30 min @ 180 F
- each panel was scribed exposing bare metal
- all panels where suspended to supports in the salt spray chamber
- panel 1 had a module connected to a 12.8 volt power supply
- panel 2 had a module connected to a power supply and was strapped in series to panels 3, 4, + 5
- sealed chamber (temp 38 C +/- 2C, voltage 12.8 +/- .5 volt, salt spray 5% solution) monitored daily
- chamber reopened every 100 hours and each panel was inspected.
- test was stopped after 1000 hours
- test was redone with a single unprotected panel… same conditions and times as first test

### Results

Test 1:
Each panel was observed through an Olympus optical microscope. Scribe marks on all panels showed no signs of rust.
Test 2
The scribe mark showed rust along the entire length. There was a noticable difference in the appearance of the scribe mark on this sample as compared to the scribe marks on the samples I Test #1

## Ohio State ElectroScience Lab

Dr Johnathon Young
Measurement of surface current
- used a 10 year old vehicle with some rusting already (older metal doesn't conduct as well as a new vehicle)
- vehicle was driven for several days after the module was installed
- 5 amps were put through the blue wire
- a 1 ohm resistor was placed in series with the blue wire (its voltage was measured with an oscilloscope Voltage = amps x resistance in ohms, so 1 volt signal shows 1 amp of current on the signal wire, high of 1.7 to 1.9 Mega Hertz).
- surface current measured using a radio receiver tuned to the strongest frequency 1.8273 MHz
- measurements were made inside a garage (out of the weather

### Results

The current sensor coil was placed against the body surface in 58 locations on all sides and top and bottom of the vehicle. In every case, the orientation of the sensor was rotated until a maximum strength tone was sensed then recorded.The fact that the loop could be orientated so that the tone was maximum, or rotated to null out the tone was regarded as an appropriate check… sensed surface current all over the surface of th test automobile