

TECHNICAL NEWS

Issue 21 April 1997

Please circulate to

Quarterly Technical Newsletter of Australia's leading supplier of low-voltage motor control and switchgear.

Pollution of the Airwaves

By Bill Mairs

NHP Electrical Engineering Products Pty Ltd

Technical Manager

From the very first days of radio and later television the problems of unwanted signals effecting the sound or picture quality have been a source of annoyance. While quality of reception is important to the broadcaster there are many other products that are effected by stray signals and if they fail to operate correctly the consequences can be quite drastic. Anybody who has flown on a commercial airline in the last few years will be aware of the warning to turn off mobile phones and other electronic devices. That the operation of what are considered everyday devices could effect the performance of the aircraft creates an uneasy feeling but it highlights a major problem.

In the industrial situation there is no hostess to warn you of the possible problems but exactly the same problems exist. The electrical noise emitted from one device can have drastic effects on another device. The number of devices that can potentially cross effect each other are increasing at a dramatic rate. Australia has introduced the first stage of controls which are designed to allow peaceful coexistence between sensitive



Micro Processor based products must now be designed not to emit RF.
The Sprecher + Schuh CET4 motor protection relay complies with both its emission and immunity standards.

devices and their noisy counterparts. This harmony is called Electromagnetic Compatibility (EMC). Unfortunately this first stage is focussed on cleaning up the pollution on the airwaves and does not go very far in ensuring electrical control products are compatible.



- Pollution of the Airwaves **1**
- What Happens **2**
- What Does it Really Mean **3**
- Who to Contact **4**

The Causes

Interference appears as a disturbance on the electric supply mains or as radio waves. In the past the major offenders producing Electromagnetic Interference (EMI) were the simple switching devices or the sparking of the brushgear in electric motors. Today we have numerous computer based products which can produce interference as well as the power devices which modify the normal supply to provide either a chopped waveform or a variable frequency supply, to say a motor load. The mobile phone has become a significant problem, more because of the likelihood of it being operated directly next to a sensitive device than the actual power level.

The introduction of the electronic variable speed drive for controlling the speed of induction motors has been a major source of EMI. The mode of operation of these drives makes them ideal noise generators and manufacturers have had to improve designs and provide add on means to reduce emissions. The installation of the drive is critical to the overall emissions, as the capacity of the electric supply and the wiring between the motor and the drive influence the emission performance. The use of filters and shielded wiring has greatly reduced the emission levels.

What Happens

Most people will be aware of interference problems associated with electronic devices. In the majority of cases the interference does not create a harmful situation. The lamp dimmer that gives the occasional blink or the TV picture which is effected by a nearby computer do not cause harm. The automatic garage door that suddenly opens or closes becomes quite annoying but the machine that is controlled by a PLC that suddenly misbehaves can become dangerous.

Finding the cause of the interference problem and eliminating it has cost industry many millions of dollars. The cost of rectification can often exceed the initial cost of the equipment involved.

Drawing the Boundaries

The new standards for EMC requirements look at the limits for EMI emissions from a device as well as the ability of the device to operate correctly when exposed to interference.

The levels of EMI vary depending on the general environment with distinctions drawn between commercial / residential and industry.

In setting limits of emission the level of immunity required of a device is made apparent. At this stage it is not intended to regulate the immunity levels but close attention is to be given to products where the risk associated with any faulty



The mobile phone is being banned from operation near sensitive control equipment by some industries.

operation, warrants regulation of the immunity levels. It is possible that mandatory immunity levels for some products will be introduced in the future.

Who is in Control

In Australia the Spectrum Management Agency (SMA) has been given the primary responsibility for, introducing a framework to introduce technical limits for the compatibility of components. SMA is responsible for, management of the radio frequencies and in the initial stages the only type of emissions being controlled are those in the radio frequency spectrum. The control of harmonics or voltage fluctuations is not part of the initial mandatory requirements of the Radio Communications Act of 1992.

(C-Tick)

The first stage of control is to limit the radio frequency emissions produced by new electrical and electronic devices. The devices that do comply with the appropriate standard can be identified with the C-Tick Mark.

Applications to use this mark are processed by SMA. This mark will now start to appear on electrical and electronic products intended for the domestic, commercial and light industrial markets. All of these products are required to comply by January 1999.

The C-Tick Mark is not to be confused with the CE mark, now on many imported components. While the CE mark may indicate compliance to European standards which include EMC requirements it is not part of the Australian compliance scheme.

The Responsibilities

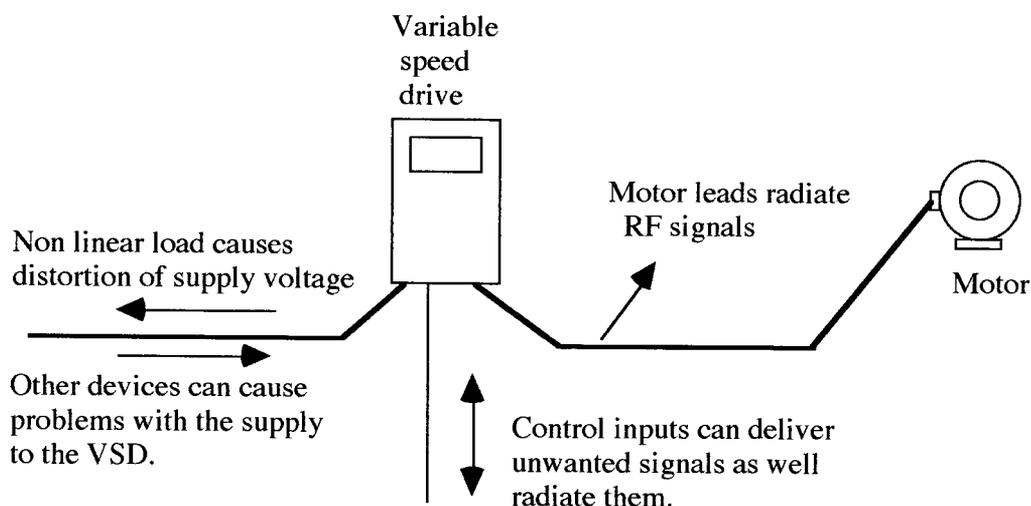
The supplier of a electric or electronic product has the responsibility of ensuring compliance to EMI standards. The supplier is required to complete a Declaration of Compliance and to maintain a Compliance Folder which contains sufficient information to justify the declaration. This folder is subject to audit by SMA and penalties apply if the necessary information is not in the folder.

What Does it Really Mean

SMA has a difficult job allocating and controlling the use of the airwaves. The demands of a communication hungry society have caused the rearrangement of communication frequencies and this has required much forward planning as different interest groups push their own causes. The regulation of

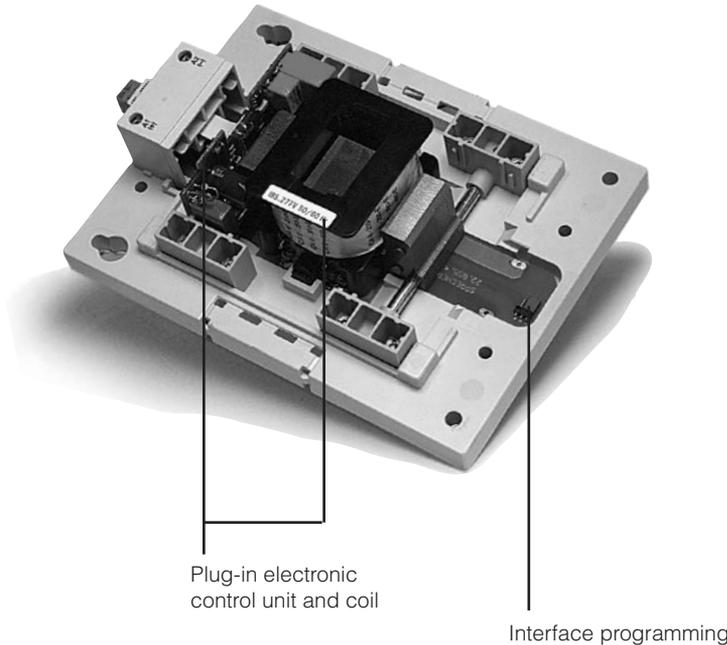
devices that can interfere with the operation of the airwaves was inevitable. While it is perhaps easy to think that the focus is solely one industry regulating another to keep them out of their patch, benefits will still flow to both groups. The greater awareness of the EMI problem caused by mandatory controls will hopefully raise the design standards, and the compatibility between products in the industrial market will improve.

While the regulation of radio emissions is an important step in improving the overall EMC problem, purchasers of electrical and electronic equipment for commercial and light industrial purposes should not rely on the C-Tick Mark. It does not certify that the product will perform correctly in the intended environment. It may still cause problems for other equipment and may still be susceptible to interference.

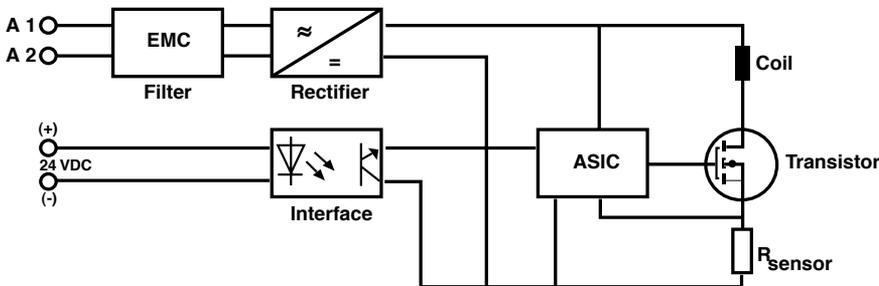


The variable speed drive can be a major source of EMI. Special filters and correct installation techniques are required to keep EMI under control.

4



Modern electronic control components like this Sprecher + Schuh coil control systems are designed on electromagnetic compatibility.



The electronic circuit of the Sprecher + Schuh CA6 contactors allows a very wide operating voltage with precise opening and closing levels. The design includes EMC filters and a built-in PLC interface.

Contact NHP for all your switchgear requirements from the one source

Editorial content: - Please address all enquiries to 'The Editor - 'NHP Technical News' PO Box 199, Richmond Victoria 3121.

NHP Electrical Engineering Products Pty Ltd A.C.N. 004 304 812

Melbourne
43 - 67 River Street,
Richmond VIC. 3121
Phone: (03) 9429 2999
Fax: (03) 9429 1075

Sydney
30 - 34 Day Street North,
Silverwater N.S.W. 2128
Phone: (02) 9748 3444
Fax: (02) 9648 4353

Brisbane
25 Turbo Drive,
Coorparoo QLD. 4151
Phone: (07) 3891 6008
Fax: (07) 3891 6139

Adelaide
50 Croydon Road,
Keswick S.A. 5035
Phone: (08) 8297 9055
Fax: (08) 8371 0962

Perth
38 - 42 Railway Parade,
Bayswater W.A. 6053
Phone: (09) 271 8666
Fax: (09) 272 3906

Newcastle
575 Maitland Road,
Mayfield West N.S.W. 2304
Phone: (049) 60 2220
Fax: (049) 60 2203

Townsville
62 Leyland Street,
Garbutt QLD. 4814
Phone: (077) 79 0700
Fax: (077) 75 1457

Rockhampton
208 Denison Street,
Rockhampton QLD. 4700
Phone: (079) 27 2277
Fax: (079) 22 2947

Toowoomba
Cnr Carroll Street &
Struan Court,
Toowoomba QLD. 4350
Phone: (076) 34 4799
Fax: (076) 33 1796

Darwin
3 Steele Street,
Winnellie N.T. 0820
Phone: (08) 8947 2666
Fax: (08) 8947 2049

Agents

Hobart
H. M. Bamford (Hobart)
199 Harrington Street,
Hobart TAS. 7000
Phone: (03) 6234 9299
Fax: (03) 6231 1693

Launceston
H. M. Bamford (Launceston)
59 Garfield Street,
Launceston TAS. 7250
Phone: (03) 6344 8811
Fax: (03) 6344 4069

Burnie
H. M. Bamford (Burnie)
8 Wellington Street,
Burnie TAS. 7320
Phone: (03) 6432 2588
Fax: (03) 6432 2580

