



Government  
of Canada  
Department of Communications

**TRC - 57**

## **TELECOMMUNICATIONS REGULATION CIRCULAR**

### **SUPPRESSION OF RADIO INTERFERENCE FROM ELEVATORS**

**MARCH 31, 1979  
(REPLACES S11-10-45 of MAY 1, 1962)**

**TELECOMMUNICATION REGULATORY SERVICE**

Telecommunications Regulation Circulars are issued from time to time to provide information to those engaged in telecommunications in Canada. The content of these circulars is subject to change at any time in keeping with new developments. Further information on the contents of this circular is available from the nearest regional office of the Department or from the Telecommunication Regulatory Service at 300 Slater Street in Ottawa.

SUPPRESSION OF RADIO INTERFERENCE FROM ELEVATORS

1. Direct Radiation and Conduction of Radio Noise - Radio interference may be caused by direct radiation of noise from the elevator and associated equipment, or by the conduction of noise on the power supply conductors, or other conductors within the noise field, such as telephone and signal wires. Radio noise may originate at any point where the circuit is interrupted, such as control relays, push buttons, commutator motors and generators, etc.
  
2. Level of Radio Noise - In general the radio noise produced should not exceed 100 microvolts per metre, quasi-peak, at 10 metres or more from the apparatus, nor should the radio noise voltage on the lighting circuits of the building exceed 500 microvolts quasi-peak, except as indicated below. If, however, the elevator is so located that it may cause harmful interference to safety services such as radio aids to air navigation, fire and police radio, etc., the noise must be reduced to a level, determined by the Department of Communications, which will not seriously interfere with such communications. Likewise, if there are broadcast receivers installed in the vicinity which will suffer interference from noise of the above values, then the noise must be reduced to a value determined by the Department of Communications. This value will be measured at the most favourable antenna locations available for the receivers concerned, and will in general be of the order of 5 microvolts per metre, quasi-peak. This value represents a 40 dB signal-to-noise ratio for a 500 microvolts per metre signal, but may be greater or less depending on such factors as the number of other stations which can be received without interference, and the economic and technical difficulty of further suppressing the noise. As an exception to the above, when elevators are installed in industrial districts, where the background of irreducible noise is great, the noise may only need to be reduced to a level, determined by the Department of Communications, which will not appreciably increase the irreducible noise from other sources.
  
3. Avoid Hazards - The person responsible for the maintenance of the elevator and equipment shall be consulted regarding any changes required for the suppression of radio interference, and any work on the elevator controls shall be done only under his direct supervision. This is very necessary as capacitors and choke coils which are not properly designed for the particular purpose are liable to interfere with certain safety features of the elevator equipment. The Department of Communications shall not be liable for damage of any sort arising from the use of this circular.
  
4. New Elevator Construction - It is recommended that consideration be given to the problem of suppression of radio interference before new elevator construction is commenced since, if suppression is necessary, it is more satisfactory and economical to apply it during the construction period than after construction has been completed. A Radio Inspector of any of the Department of Communications District Offices is prepared to advise on these matters.

5. Commutator Noise - Radio noise may originate at the brush-to-commutator contacts and may be suppressed by connecting a 0.1 microfarad capacitor from brush holders to the frame of the machine with leads as short as possible. In order to ensure the necessary low impedance of the suppressor circuit from brush holder to motor frame at high radio frequencies, it is necessary to use low impedance capacitors with short leads connected from each brush holder to the frame of the machine. (See TRC-55)

6. Control Relays

(a) Surge Suppressors on Individual Relays - The most intense radio noise is usually produced by the operation of various control relays. The intensity of the surge, and hence of the resulting radio noise, caused by the operation of these relays may be reduced by the installation of capacitors on each relay. The use of such capacitors must be approved by the designer of the elevator control equipment, to ensure that they do not interfere with the correct operation of the control equipment, particularly with regard to safety devices.

(b) Shielding Relay Racks - As an alternative to the suppression of noise from each individual relay, it is recommended that the control racks be completely shielded to prevent direct radiation.

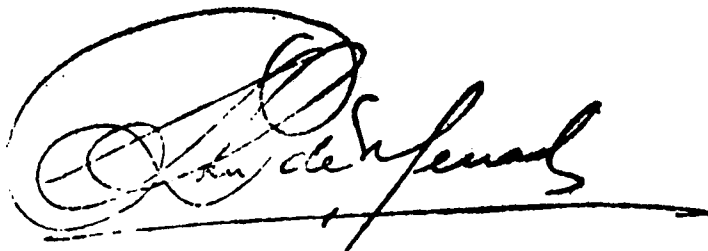
Metal panels should entirely enclose the control relay racks and these shielding panels should overlap at all joints two centimetres or more and fit very closely at all points. They should be sufficiently rigid, to prevent any gaps around their edges and may be drawn tight with a special lock similar to a refrigerator door lock. The panels should make good electrical as well as mechanical contact throughout their perimeters and for this purpose the metal edges should be clean and free from paint or corrosion. Where ventilation is necessary the openings should be protected with bronze gauze or galvanized wire cloth, galvanized after weaving. Shielding which is well constructed will probably provide a suppression of direct radiation from the operation of the relays, as much as 40 dB. (A reduction of the noise voltage to one percent of its original value).

(c) Replacement of Shielding After Repairs - In cases where the unshielded relays cause interference in excess of the tolerable limit, an interlock may be provided to automatically switch off the elevator when the shield is removed, or a warning light may be provided in the elevator cab to indicate when the shielding is not effectively in place. Consideration will be given to the substitution of other means or arrangements which will provide reasonable assurance that the equipment will not be used with the shield removed.

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7. Bonding, Grounding and Capacity from Noisy Conductors to Ground - Frequently the greatest reduction in radio noise may be obtained by providing paths by which the radio noise may be drained from noisy conductors to ground at many points.
- (a) Travelling Cable - The travelling cable is frequently one of the greatest noise transmitters and the noise via this path may best be eliminated by shielding all travelling cables in tinned copper braid, thoroughly bonded to the metal of the elevator cab and to a ground conductor, wherever it is attached to the side of the elevator shaft. This copper braid shield should be covered with insulating material as intermittent contact with the braid would cause radio noise. As an alternative to covering the travelling cable with shielded braid, it is sometimes sufficient to provide spare conductors in each of the travelling cables and to ground these spare conductors to the metal of the cage and to a ground conductor in the elevator shaft. Radio noise is drained off the live conductors in the travelling cable through the capacitance between the live conductors and grounded spare conductor.
- (b) Conductors - Where noise voltage is found on conductors, consideration should be given to connecting capacitors of 0.1 microfarad capacitance from noise line to ground, but approval of the elevator company must be obtained before connection is made. "Feed through" type capacitors are most effective.
8. Bonding Non-Current Carrying Metal Parts - All non-current carrying metal parts within the radio noise field of the elevator system should be thoroughly bonded at many points, and grounded wherever possible. The elevator doors should be bonded to the elevator cage.
9. Interference Suppressors in Power Conductors - An effective radio interference suppressor shall be installed in the power circuit not nearer than 3 metres from the control relays. The case of the suppressor shall be grounded with a separate ground conductor as direct as possible to a good ground. An electric conduit is not suitable for this purpose and a water pipe or driven ground rod should be used. If possible the suppressor should be installed at a location where the suppressor case may be grounded to a point on the water pipe not more than 3 metres from where the water pipe enters the ground. The power supply from the suppressor to the elevator control should be in conduit grounded at as many points as convenient.
10. Test of Radio Interference from Elevators - One or more of the radio receivers on which elevator interference is suspected should be tuned to a distant station. If tuned to a local or powerful station the a.v.c. of the receiver reduces its sensitivity so that radio noise of low intensity will not be heard. All the observers of the radio receivers should know exactly the instant that the elevator starts and stops at each floor, so that any noise heard on the receivers may be definitely associated with the movement of the elevator. This may be done either by signals from somebody watching the movement of the elevator or by the elevator operator and the radio observer synchronizing their watches and the elevator operated according to a predetermined time schedule.

11. Amount of Suppression Required - Where suppression is required the Radio Inspector will estimate the degree of suppression (expressed in dB) and will make a detailed recommendation regarding how this suppression may be most economically and practically effected.

A handwritten signature in black ink, appearing to read "John deMercado", written over a horizontal line.

Dr. John deMercado  
Director General  
Telecommunication  
Regulatory Service