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Original

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Application of thyristors in railway technology - Measures for the prevention of functional disturbance in signalling installations

*Utilisation des thyristors en technique ferroviaire - Dispositions pour éviter les dérangements des
installations de signalisation*

*Verwendung von Thyristoren in der Eisenbahntechnik - Maßnahmen zur Vermeidung von Störungen an
signaltechnischen Einrichtungen*



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
INTERNATIONAL UNION OF RAILWAYS

Leaflet to be classified in Volumes :

V - Rolling Stock

VI - Traction

VII - Way and Works

Application :

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For design and construction:

- of traction vehicles used in international traffic,
- of passenger coaches used in international traffic,
- of signalling equipment.

All members of the International Union of Railways

Record of updates

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Important: the articles (points) in this leaflet have been renumbered in the new edition. The first digit of each point has been increased by one (i.e. 0 becomes 1, 1 becomes 2, and so on). Please take account of this when using cross-references from other leaflets.

The person responsible for this leaflet is named in the UIC Code

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Summary

The electrical circuit of a traction current comprises, besides the traction vehicle, the substation, the overhead line, rails, track, ground and often an earth cable and a return conductor.

Signalling installations usually use the track as a transmission medium. It can therefore be exposed to interference, which may result in unsafe operation.

The signalling track circuits may use D.C. (not with D.C. traction) or A.C.

There are A.C. track circuits which operate with 25 - 400 Hz, sine-wave or modulated signal. Also pulsed track circuits, A.C. track circuits at 0,8 - 3 kHz (sine-wave, pulse- or frequency modulated A.C.) or A.C. track circuits at 8 -100 kHz are used.

Axle counters are also used.

Driving cab signalling via track circuits with discontinuous or continuous function exist. Also intermittent train control with resonant systems or carrier frequencies (4,5 - 27 MHz) are used.

In the second half of the leaflet, possible measures to improve the electromagnetic compatibility between the disturbance source and the disturbed object are listed. Measures can be made in the substation, in the track and in the traction vehicle. Also the design of the track circuits are dealt with.

1 - General

1.1 - Field of application

Thyristors are used in the construction of converters which are used:

- on traction vehicles,
- on passenger vehicles, to supply electrical apparatus,
- in traction substations for frequency conversion.

These static converters are sources of harmonics which can disturb signalling systems.

This leaflet is intended to:

- identify the disturbances to which signalling installations are exposed due to the electric traction installations, particularly where thyristors are used,
- set forth remedies and propose recommendations to avoid the disturbances due to this interference.

1.2 - References

This document summarizes in a condensed form, from the signalling installation point of view, the essential results given by the work of the ORE Specialists' Committee A 122.

The relevant details are contained in the reports and technical documents published by the ORE¹ Specialists Committee A 122 (see Bibliography - page 14).

1. ORE became ERRI, the European Rail Research Institute in January 1992.