

**RECOMMENDED CHARACTERISTICS FOR COLLECTIVE AND  
INDIVIDUAL ANTENNA SYSTEMS FOR DOMESTIC RECEPTION OF  
SIGNALS FROM TERRESTRIAL TRANSMITTERS**

(Question 7/11)

(1970-1986)

**1. Scope**

Installations may be classified according to the number of users served. An individual antenna serves one user, even though it may be associated with several receivers. A collective antenna serves all or part of a building and hence a larger number of users.

This Report applies to antenna systems for individual or collective use designed to receive television broadcasts in bands 8 (VHF) and 9 (UHF) and also to the associated equipment of such systems: the transmission line, amplifiers, couplers, etc., used to convey the signal to the television receivers, taking into account the transmission of data signals (e.g. teletext) in the structure of the television waveform.

- It does not apply to television antennas for cabled distribution systems.
- Reference is made to IEC Publication No. 728-1 (1986).
- The relevant figures identified by "\*" are based on investigations carried out in Italy [CCIR, 1982-86a, b].

**2. General input requirements**

The received input signals lie in those parts of band 8 (VHF) and band 9 (UHF) allocated to terrestrial broadcasting and used for television.

The field strength of the wanted signal should be sufficient to be protected against interference.

**3. Receiving system configuration****3.1 Individual reception**

The receiving system consists of the antenna, the connecting cable and the television receiver.

**3.2 Collective reception**

The receiving system consists of the antenna (or a group of antennas), the head-end amplifiers, converters, filters, etc.), the distribution network and the television receivers.

**4. Antenna characteristics**

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|-----|--|--------------|
| 4.1 | In unbalanced systems, the nominal impedance should be | 75 $\Omega$  |
|     | In balanced systems, the nominal impedance should be   | 300 $\Omega$ |

**4.2 Reflection coefficient:**

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|------------------------------|--------|
| television signals only:     | < 0.33 |
| television and data signals: | < 0.2* |

- 4.3 Gain: should be expressed relative to that of a half-wave dipole for each of the channels to be received.
- 4.4 Gain variation within a channel:  $\pm 0.5$  dB\*
- 4.5 Front-to-back ratio:  $> 18$  dB
- 4.6 Protection against a linearly polarized wave whose polarization plane is perpendicular to that of the antenna (reception in the main lobe):  $> 20$  dB
- 4.7 Directivity characteristics: see Recommendation 419.

## 5. Coaxial cable characteristics

- 5.1 Nominal impedance:  $75 \Omega$

## 6. Performance requirements of the receiving systems

### 6.1 Vision carrier levels

6.1.1 The vision carrier levels at system outlets (measured across a  $75 \Omega$  termination or referred to  $75 \Omega$ ) for each channel should not exceed the following values:

	<i>Minimum</i>	<i>Maximum</i>
Band 8 (VHF) television	0.7 mV (−52 dBm)	14 mV (−26 dBm)
Band 9 (UHF) television	1.0 mV (−49 dBm)	14 mV (−26 dBm)

Where several adjacent channels are distributed, the maximum carrier levels at the RF input socket of the television receiver should be at a reduced level in order to avoid intermodulation in the television receiver itself [CCIR, 1982-86b].

6.1.2 The maximum carrier-level differences between distributed television channels at system outlets should not exceed 12 dB in band 8 (VHF) and not exceed 15 dB for a system covering both bands 8 (VHF) and 9 (UHF). The maximum level difference between adjacent channels should not exceed 3 dB.

### 6.2 Mutual isolation between system outlets

The isolation between two different outlets must be at least 22 dB for all the frequencies in the broadcasting bands. This value assumes that the frequency allocation and the intermediate frequency of the receivers have been planned to avoid interference.

*Note 1.* – This value is raised to 46 dB between an outlet for television signals in bands 8 and 9 and an outlet for frequency modulation sound broadcasting signals with two different users. The selection circuits required form an integral part of the installation.

*Note 2.* – The minimum isolation figure of 22 dB is under study; a higher value is a requirement in some countries.

### 6.3 Response variations with frequency within a television channel at any system outlet

#### 6.3.1 Amplitude response

The variation of the amplitude response over any television channel should not be more than  $\pm 2$  dB relative to that at the vision carrier frequency, and the slope of the variation should not be more than 0.5 dB within any frequency range of 0.5 MHz.

#### 6.3.2 Group-delay response

The group-delay variation within any television channel must not be more than 50 ns\*.  
This value is relaxed to 100 ns\* if the television channels do not carry any data signal.

#### 6.4 Reflection coefficient

In order to meet the above requirements for amplitude and delay response, the reflection coefficient of the passive and active equipment used in the receiving system should not exceed the following values:

	Television only	Television and data *
Passive equipment	≤ 0.33	≤ 0.2
Couplers and filters	≤ 0.33	≤ 0.2
Active equipment	≤ 0.33	≤ 0.2

#### 6.5 Oscillators and other equipment used in the system

The levels of the energy radiated and the energy re-injected into the distribution system should be less than the values which may be specified by the CISPR.

The total frequency drift of the oscillators should not exceed the value of  $\pm 50$  kHz\* (relaxed to  $\pm 75$  kHz if the television channels do not carry data signals) for variations in the supply voltage of  $\pm 10\%$  and a temperature range of  $-10$  °C to  $+55$  °C. This value applies to both band 8 (VHF) and band 9 (UHF).

#### 6.6 Carrier-to-noise ratio

The carrier-to-noise ratio at any point from the head-end input to the system outlets shall not be less than the values given in Table I, where the noise bandwidth is also indicated.

TABLE I

System	Minimum carrier-to-noise ratio (dB)	Noise bandwidth (MHz)
625-line system I	43	5.08
B, C, G and H	43	4.75
L and K1	43	5.58
D and K	43	5.75
525-line system M	42	3.33

#### 6.7 Intermodulation

##### 6.7.1 Channel amplifiers or converters

When measured by the method described in IEC Publication No. 728-1, the ratio of the reference level relative to the interference signal shall not be less than 54 dB.

#### 6.8 Interference

The installation should cause neither interference at fixed frequencies nor cross-modulation products (between signals from different transmitters) which, assuming they are referred to the receiver input, would interfere with reception from the wanted transmitters, in the service area as defined by the protected field.

#### 6.9 Reception of data signals in the collective antenna systems

The introduction of teletext and other data services (see Report 802) requires that the technical characteristics of the receiving installations ensure satisfactory reception quality for both television and data services.

Theoretical and experimental investigations carried out in Italy [Cominetti and Stroppiana, 1984] have shown that, because of the different nature of the two signals (analogue and digital), the potential audience can be different for the two services particularly in the case of reception through collective antenna systems. Teletext reception in such installations poses special problems mainly caused by the many potential sources of impairments, such as channel converters, amplifiers, filters, coaxial cables and other passive components used to distribute the signals to the user's outlet.

Further investigations are necessary to ensure comparable performance regarding reception of television and data services.

#### REFERENCES

COMINETTI, M. and STROPPIANA, M. [1984] Ricezione Teletext negli impianti centralizzati d'antenna. *Elettronica e Telecomunicazioni*, 2.

*CCIR Documents*

[1982-86]: a. 11/349 (Italy); b. 11/359 (Italy).

#### BIBLIOGRAPHY

*CCIR Documents*

[1966-69]: XI/6 (United Kingdom); XI/25 (Canada); XI/165 (France); XI/169 (Spain); XI/184 (Italy).

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#### REPORT 805-1

### SUBJECTIVE QUALITY TARGETS OF OVERALL TELEVISION SYSTEMS \*

#### Characteristics of reference receiving installations

(Question 14/11, Study Programme 14B/11)

(1978-1982)

#### 1. Introduction

Many characteristics of television receivers may be defined together with methods of measurement and practical values. Question 14/11 and Study Programme 14B/11 call for the study of the principal characteristics of television receiving installations which may be required in meeting the necessary subjective quality targets for an overall television system.

The quality of the picture displayed and of the sound heard depends on characteristics of the complete television system from the studio to the receiver screen or loud-speaker, and in this context the main parameters of a television receiver, other than those primarily involved in frequency planning, may be of interest. The CCIR has collected a great deal of data which is embodied in various Recommendations and Reports, but much of this has been rendered obsolete by the development of receiver design techniques.

Table I of § 4 of this Report lists technical parameters which contribute to the determination of overall picture quality. Table II of § 5 gives typical measured values by way of example.

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\* Information on specifications for low-cost monochrome television receivers is to be found in Report 483. Information on the characteristics of television receivers and receiving antennas is to be found in Report 625.