



**Trade Association for
Content Delivery**

Code of Practice

CAI COP 06 – April 2013

Dealing with interference caused by signal
generation into TV, Radio and Satellite Bands

CAI Codes of Practice are available in an electronic format and may be downloaded freely by Members of the CAI.

Members of other professional organisations (architects, surveyors, consulting engineers, electricians etc) with an interest in the aerial industry may request to be registered onto the database to receive a copy and be advised of updates. Such individuals are requested to register their interest on the CAI website:- www.cai.org.uk/cop/

For those not in an applicable professional organisation, then a charge will apply. Details of costs of CAI Codes of Practice are on the website.

Please note that although these documents are available in an electronic format, they are copyright protected and must not be published on other websites. This ensures that the current version is only ever available. To see if you have the current version, please check here:- www.cai.org.uk/cop/

E.&O.E.

Code of Practice

CAI COP 06 – April 2013

Dealing with interference caused by signal generation into TV, Radio and Satellite Bands

This document has been prepared by the Board of Directors of the Confederation of Aerial Industries Ltd (CAI).

AIMS OF THE CAI

- To raise standards within the Industry.
- To represent its Members to Government, Local Authorities, National Bodies etc.
- To unite the Industry on its common aims.
- To keep abreast of technological change.
- To promote the membership to its prospective customers.

SOME SERVICES AVAILABLE

- Information Service.
- Training Courses.
- Technical Advice.

The CAI actively encourages all companies in the Industry to further its aims and to use the services available. Full details and application forms to join the CAI are available from the Secretary.

This Code of Practice does not purport to include all the necessary provisions of a contract. Users of this Code are responsible for its correct application. CAI Codes of Practice are revised when necessary by the issue either of amendments or of revised editions. It is important that users of CAI Codes of Practice should ascertain that they are in possession of the latest amendments or editions. Every effort has been made to ensure that the information contained within this Code of Practice is correct at the time of going to press. Any person who, when making use of this Code of Practice, encounters any inaccuracy or ambiguity, is requested to notify the CAI without delay in order that the matter may be investigated and appropriate action taken.

© Copyright. The Confederation of Aerial Industries Ltd 2013

All rights reserved. The contents of this publication may not be reproduced in any form without the prior written consent of the Confederation.

First issued in April 2013

Confederation of Aerial Industries Ltd
Communications House
41a Market Street, Watford, Hertfordshire, WD18 0PN

Tel: 01923 803030 Fax: 01923 803203

Email: office@cai.org.uk

Website: www.cai.org.uk

Contents

| | | |
|--------|---|--|
| 1. | INTRODUCTION AND SCOPE | 2 |
| 1.1 | The Code | 2 |
| 1.2 | Scope and Purpose | 2 |
| 1.3 | Health and Safety | 2 |
| 1.4 | Electromagnetic Compatibility | 2 |
| 1.5 | Definitions and Glossary of Terms in relation to this document | 2 |
| 2. | INSURANCE | 3 |
| 2.1 | Liability Insurance | 3 |
| 2.2 | Accident Cover | 3 |
| 3. | SUITABILITY OF SITE | 3 |
| 4. | LICENSING AND PLANNING | 3 |
| 5. | GROUNDWORK | 3 |
| 6. | INSTALLATION STAFF | 3 |
| 6.1 | Engineers/Technicians | 3 |
| 6.2 | Identification | 3 |
| 7. | CUSTOMER RELATIONS | 3 |
| 7.1 | Installation Liaison | 3 |
| 8. | INSTALLATION AND TEST EQUIPMENT | 3 |
| 8.1 | Vehicles | 3 |
| 8.2 | Test Equipment | 3 |
| 8.3 | Signal Measurement | 4 |
| 9. | CHOICE OF MATERIALS | 4 |
| 10. | TERRESTRIAL / SATELLITE RECEPTION | 4 |
| 10.1 | General | 4 |
| 10.2 | Terrestrial Reception | 4 |
| 10.2.1 | Terrestrial Aerial Selection | 4 |
| 10.2.2 | Terrestrial Aerial Groups | 4 |
| 10.2.3 | Siting of Terrestrial Aerials | 4 |
| 10.3 | Satellite Reception | 5 |
| 10.3.1 | Satellite Dish Selection | 5 |
| 10.3.2 | Satellite Bands | 5 |
| 10.3.3 | Siting of Satellite Dishes | 5 |
| 11. | SIGNAL MEASUREMENT/SYSTEM LIMITS – Terrestrial | 5 |
| 11.1 | General | 5 |
| 11.2 | Interference | 5 |
| 11.3 | Use of Amplifiers | 6 |
| 11.4 | Fitting of Filters | 6 |
| 11.5 | Combined Filters & Levellers and Channelised Amplifiers – Systems | 6 |
| 11.6 | Multiswitches | 6 |
| 11.7 | Fibre Systems | 6 |
| 11.8 | Choice of Remodulation Channel | 6 |
| 12. | SIGNAL MEASUREMENT/SYSTEM LIMITS – Satellite | 7 |
| 13. | CABLE AND WIRING | 7 |
| 13.1 | General Cabling Requirements | 7 |
| 13.2 | Cable Connections | 7 |
| 14. | COMPLETION OF INSTALLATION | 7 |
| 14.1 | Reporting of Final Installation | 7 |
| 15. | SYSTEM SAFETY | 7 |
| 16. | STANDARD CONDITIONS OF TRADING | 7 |
| 17. | CUSTOMER CARE | 7 |
| 18. | APPENDICES | 8 |
| | Appendix A | Standard Example Job Sheet |
| | Appendix B | Dangerous Situation Report |
| | Appendix C | List of Relevant Standards and Other Reference Documents |

1 INTRODUCTION AND SCOPE

1.1 The Code

This Code of Practice is issued by the Confederation of Aerial Industries Ltd (CAI) to all of its Members. The observance of this Code is mandatory for all Members who undertake mitigation techniques on aerial systems from interference generated by signal sources into the bands for TV and radio reception. Any deviation from this Code shall only be permitted as a matter of practicality in a particular situation and shall be advised to the Client in writing. Responsibility for the implementation of this Code rests solely with the Member. The CAI inspectorate examines Members' workmanship on any inspection visit as well as in the case of a dispute.

1.2 Scope and Purpose

This Code of Practice should be read in conjunction with all other CAI Codes (see Appendix H) and is based upon British Standards relevant to the industry (also see Appendix H for a list of those Standards). The Code covers mitigation of interference on antennas for the reception of FM radio signals in Band II, Digital Audio Broadcasting in Band III, Digital Terrestrial Television (DTT) signals in Bands IV and V and Digital Satellite Television (DST) at both fundamental and Intermediate Frequency (IF). This Code also applies to any locally generated/modulated programming to be carried on the network, by any modulation technique, insofar as it uses carrier frequencies in the range specified below:-

- (a) In respect of satellite transmissions, this Code applies to reception in the 3.7 GHz to 40 GHz range.
- (b) In respect of signal distribution by coaxial cable, this Code applies to carrier signals in the range 87.5 MHz to 3850 MHz.
- (c) In respect of return paths in coaxial cable, this Code applies to signals in the range 5 MHz to 65 MHz.

1.3 Health and Safety

A prerequisite to achieving a high standard of safety is that all those engaged on installation work shall be fully conversant with safety procedures, precautions and use of Personal Protective Equipment (PPE). They shall also be fully competent to perform the tasks required of them and be able to recognise potentially hazardous working conditions. These procedures are detailed in the CAI publications:-

- Health & Safety in the Aerial & Satellite Industries
- Guidelines for Safe Operating Procedures

Where an existing system is considered unsafe, the Client shall be notified in writing as soon as possible. See Appendix D – Dangerous Situation Report.

1.4 Electromagnetic Compatibility

BS EN 50083-2 'Electromagnetic Compatibility of Equipment for Cabled Distribution Systems for Television and Sound Signals' is mandatory for all types of systems covered by this Code. All active and passive equipment shall conform to the EMC requirements and be CE marked.

BS EN 50083-8 + A11 'Electromagnetic Compatibility for Networks' specifies the radiation limits and measurement from cabled distribution systems operating in the frequency range 0.15 MHz to 3.0 GHz.

1.5 Definitions and Glossary of Terms in relation to this document

4G: Fourth Generation. Mobile devices using LTE standards

Antenna;antennas:

Aerial(s) designed for the reception of Radio Frequency (RF) signals, however constructed.

BER: Bit Error Ratio.

BS...: The relevant Standard currently in force as published by the British Standards Institution or the harmonized European Standard, BS EN.

CAI: Confederation of Aerial Industries Limited.

CAI Approved Systems Installer:

A member who has one or more engineers who have a qualification in the design, installation and maintenance of systems. (See System Installer)

CE Mark: Consultants Europe. Certification Scheme for equipment compliance.

C/N: Carrier to Noise Ratio, difference between modulated carrier and noise floor.

DTT: Digital Terrestrial Television.

DVB-S/S2: Digital Video Broadcast – Satellite.

DVB-T/T2: Digital Video Broadcast – Terrestrial.

EMC: Electromagnetic Compatibility.

Engineer: Person competent to work on installation or maintenance of a signal reception system according to CAI Codes of Practice.

FEC: Forward Error Correction.

FM: Frequency Modulated/Modulation.

IEC: International Electrotechnical Commission.

LTE: Long Term Evolution.

MDU: Multiple Dwelling Unit.

MER: Modulation Error Ratio.

Member: Member of the CAI.

Multi-path effect: (Ghosting)

Secondary signal received at an aerial caused by a reflection.

Multiplex: A digital transport stream of all the digital data carrying a number of services within a single broadcast channel.

PPE: Personal Protective Equipment.

Receiver: Can mean a TV, radio or set top receiver for DVB-S/S2 and DVB-T/T2 including video recorders, PVRs, recordable DVDs and computers.

RF: Radio Frequency.

RoHS: Restriction of Hazardous Substances.

SDU: Single Dwelling Unit, be it detached, semi-detached or terraced. This would also include an individual apartment, flat or maisonette etc.

SMATV: Satellite Master Antenna Television. Similar to MATV with the addition of locally modulated signals, commonly satellite programmes.

System: A network that feeds RF signals to multiple points. See CATV, MATV, SMATV and IRS.

Systems Installer:

A member registered with the CAI who claims competence in installing systems. (See CAI Approved Systems Installer).

UV: Ultraviolet radiation, that part of the Electromagnetic spectrum that causes degradation of certain materials.

WEEE: Waste Electrical and Electronic Equipment.

For additional terms refer to the CAI Website Glossary - <http://www.cai.org.uk/site/glossary>

2 INSURANCE

2.1 Liability Insurance

Members shall comply with current statutory obligations in respect of Public Liability and Employer’s Liability Insurance. Notwithstanding the above, Members affected by this Code shall carry a minimum of £2,000,000 Public Liability Insurance cover for single dwelling units and £5,000,000 for multiple dwelling units and commercial work. This minimum shall be increased if so required by any Client in respect of any installation covered by this Code.

2.2 Accident Cover

Members are advised to take out personal accident insurance consistent with the hazardous nature of the work involved.

3 SUITABILITY OF SITE

At an early stage the Client shall be consulted with regard to the positioning of aerials, satellite antennas and network components. The soundness of the structure to support such aerials/antennas shall also be checked but where this is in doubt, a structural engineer shall be consulted. Architects and Clients shall be made aware of the desirability of mounting aerials and satellite antennas clear of surrounding objects and with a clear “view” towards the appropriate transmitters. It is the responsibility of the Member to determine the suitability of the receiving site prior to the commencement of the installation and to advise the Client of any problems.

4 LICENSING AND PLANNING

In July 2003, the UK implemented an EU framework for the regulation of electronic communications networks and service providers. The framework sets out a harmonised and technology neutral regime for the regulation of communications companies across the EU and is covered by The Communications Act, to which all systems shall legally comply.

Where relevant the Client shall also be made aware of the Government document entitled “A Householders Planning Guide for the Siting of Satellite Television Dishes”. Copies are available from the CAI website.

5 GROUNDWORK

Provision for all groundworks, mast plinths, king posts, trenching, cable ducts etc, shall be established at an early stage.

6 INSTALLATION STAFF

6.1 Engineers/Technicians

All engineers of the member company undertaking this work shall be trained to CAI standards of competence in the mitigation of interfering signals. Only CAI Approved Systems Installers shall undertake mitigation work on MDU and Commercial premises.

6.2 Identification

All members of staff should carry photographic identity cards. It is preferred that all Members display the CAI logo on their installation/maintenance vehicles and relevant stationery.

7 CUSTOMER RELATIONS

7.1 Installation Liaison

Following an initial appraisal of the situation the engineer shall liaise with the Client and advise what mitigation is required. Should this require new antennae and/or cable then before this work is commenced the engineer should discuss the siting of the aerial/antenna, method of cable entry, its run and its termination. Attention shall be drawn to any matters concerning the structure of the building, such as defective brickwork, and every effort shall be made to work tidily and to avoid undue dust, debris etc. Where the mitigation does not involve new or relocated antennae the Client should be advised as to what work is necessary and, in every case, any associated cost before the commencement of the work.

8 INSTALLATION AND TEST EQUIPMENT

8.1 Vehicles

Vehicles shall be adequately equipped to include ladders, roof ladders and tool kits, including PPE, to enable the installation staff to execute an installation conforming to this Code.

8.2 Test Equipment

The minimum requirement for test equipment is as follows:-

- (a) Inclinator and compass or other means to identify satellite locations.
- (b) Spectrum analyser (see below).
- (c) Multimeter.
- (d) The Member shall have available the means to demonstrate the quality of reception, which shall include the applicable set top box, TV or measuring equipment that can demonstrate picture and sound quality on all signal types received.

8.3 Signal Measurement

When measuring signals on any type of system, it is important that the instrument used is within the accuracy limits specified herein and designed for the particular service. Analogue meters will not measure digital terrestrial or satellite correctly so it is essential to use measurement instruments designed for the purpose.

A spectrum analyser capable of the following is required:-

Measurement in the frequency range specific to the services provided.*

Absolute level accuracy of ± 2 dB.

C/N accuracy of ± 3 dB.

Bit Error Ratio (BER).

Modulation Error Ratio (MER).

within the following bands as appropriate:-

87.5 -108 MHz; 117-450 MHz; 470-860 MHz; 950-2150 MHz

*For return path measurements this will require an analyser measuring down to 5 MHz.

It is essential that the accuracy of the meter be checked at least annually, to recognised national standards or in accordance with the manufacturer's guidelines. Where applicable a calibration certificate shall be available for inspection.

A spectrum analyser may have many functions in addition to the above, but for a satisfactory system set up and commissioning the options listed are minimum requirements.

9 CHOICE OF MATERIALS

UV stability – the outer covering of all items – cables, paint finish, housings etc – installed externally in a system shall protect those items from the long term degradation effects of ultra-violet light.

Weather resistance – all materials used externally in the installation of a system shall be resistant to the adverse effects of weather during the normal life expectancy of the product and due regard to the environment in which it is installed.

Chemical reactivity – all materials used in the installation of a system shall be chemically neutral and non-reactive to any item, whether solid, liquid or gaseous, with which it might reasonably be expected to contact during its lifetime. This includes the degree of acidity found in rainwater.

EMC/RoHS/WEEE – all electronic items used in the installation of a system shall be EMC compliant with regard to unwanted effects on the system, have been tested to relevant IEC standards and carry the CE mark. All applicable products should be compliant to RoHS and WEEE Directives.

10 TERRESTRIAL / SATELLITE RECEPTION

10.1 General

It is essential that suitable quality materials are used and that the work is carried out with due regard for public safety. As the installation is a metal structure it is elastic to some degree. Whenever it is

continually flexed by the action of the wind or other vibration, the metal section that is experiencing most strain is subject to change whereby it becomes 'work hardened' and brittle, it ceases to be elastic and may break. The effect is termed 'metal fatigue' and it can be avoided by ensuring the structure is sufficiently robust to resist excessive flexing.

Many of the metal parts of an installation are fabricated of aluminium, which has a natural protective oxide film on its surface. This film can be destroyed if the installation is exposed to a sulphurous or acidic emission from a chimney. The effects of this corrosion can be minimised by positioning the antenna away from the chimney outlet. Where this is not possible a minimum vertical clearance of 1.25 m between the antenna and the top of the chimney shall be maintained. In extremely difficult reception areas, where the antenna will only receive useable signal if positioned closer than 1.25 m to the top of a chimney, the Client shall be informed of a possible reduction in the life expectancy of the antenna.

If dissimilar metals are brought into contact, they and/or their finishes shall be selected so as to minimise galvanic corrosion.

10.2 Terrestrial Reception

10.2.1 Terrestrial Aerial Selection

For digital transmissions it is essential that the aerial be matched to 75 Ohms. Where it is possible to use an aerial that has passed the CAI Benchmarking Scheme, then that aerial shall be used.

Where an aerial is to be changed it is recommended that one from the new groups be chosen (Table 1)

For aerial parameters, see the CAI Aerial Benchmark and refer to industry websites for information on possible changes to channel allocations.

10.2.2 Terrestrial Aerial Groups

(showing LTE Benchmarked UHF Television groups)

Table 1

| CHANNELS/ FREQUENCY | GROUP/ BAND | COLOUR CODE |
|----------------------------|----------------|----------------|
| UHF Television | | |
| 21 – 37 | A | Red |
| 21 – 60 | T | White |
| FM Radio | | |
| 87.5 – 108 MHz | Band 2 | |
| Digital Audio Broadcasting | | |
| 217.5 – 230 MHz | Part Band 3 | |

10.2.3 Siting of Terrestrial Aerials

In order to avoid unnecessary hazard, aerials shall not be sited directly above any area to which the public has access. In addition the position of any overhead power lines shall be noted and their close proximity avoided.

Reference shall be made to the CAI document 'Health & Safety in the Aerial & Satellite Industries'. The aerial shall be kept as clear from local obstruction as possible. Where more than one aerial is mounted on a mast, a vertical distance greater than half the wavelength of the lowest frequency being received shall be maintained between aerial dipoles to avoid possible signal degradation.

Table 2

| Band | Longest Wavelength | Half Wavelength |
|----------|--------------------|-----------------|
| II FM | 3.4 m | 1.7 m |
| III DAB | 1.4 m | 0.7 m |
| IV/V UHF | 0.64 m | 0.32 m |

A spectrum analyser or other suitable meter shall be used to ensure that the optimum receivable signal is obtained. The analyser/meter should be used not only to locate the direction of maximum signal strength and quality, but also the optimum height and lateral position of the aerial. In difficult reception areas, a balance between the digital multiplexes should be attempted, rather than have one or two channels much stronger than the others. In the case of DTT signals, C/N or MER shall be checked and where possible BER. Additionally, a check of all required services on a suitable receiver shall be made before the final position of the aerial is established. Every endeavour shall be made to eliminate multi-path effects. Where an aerial is aligned off boresight to mitigate the effect of interfering signals the degree of movement will be no more than the beamwidth of the aerial, i.e. a loss of 3 dB from maximum.

10.3 Satellite Reception

10.3.1 Satellite Dish Selection

In order to reduce the effect of external interference care shall be taken to select:-

- a dish of the appropriate size and efficiency,
- an LNB and feedhorn that correctly illuminates the dish, with the correct local oscillator/s and of the appropriate gain, noise figure and phase noise etc

for the chosen satellite transmitter's downlink budget calculation.

The assembly of the antenna and LNB shall conform to the manufacturer's instructions.

10.3.2 Satellite Bands

For the purpose of this Code, the frequency ranges according to the IEEE are as follows:-

| | |
|---------|------------------|
| C Band | 4 – 8.0 GHz |
| X Band | 8.0 – 12.0 GHz |
| Ku Band | 10.95 – 14.5 GHz |
| Ka Band | 26.5 – 40 GHz |

10.3.3 Siting of Satellite Dishes

As well as following the regulations regarding the siting of dishes in Codes of Practice 1 and 2 care should be taken that any dish is not sited in such a

way as to be vulnerable to signals from, for example, point-to-point microwave antennas.

11 SIGNAL MEASUREMENT / SYSTEM LIMITS - Terrestrial

11.1 General

See relevant sections in Codes of Practice 1 and 2 but for DTT a level of between 50 and 55 dBµV should be aimed for at the outlet.

11.2 Interference

As far as is practical, in areas where the rollout of LTE has not been completed, account should be taken of future increases in interfering levels and this should be explained to the client.

Table 3 – Digital Broadcast Minimum Carrier to Noise Ratios

| Service | System | Minimum Carrier/Noise Ratio (dB) | |
|-----------------------------|----------|--------------------------------------|-----------|
| | | at antenna (clear sky conditions) | at outlet |
| Television – terrestrial | DVB – T | 27 | 23 |
| | DVB - T2 | 30 | 26 |
| Television – satellite | DVB – S | 13 | 10 |
| | DVB - S2 | 13 | 10 |
| Radio | DAB | 18 | 15 |

Table 4 – Digital Broadcast Modulation Error Ratios

| Service | System | Fail | Marginal | Pass (dB) |
|-----------------------------|----------|------|----------|-----------|
| Television – terrestrial | DVB - T | <18 | 19 - 22 | >23 |
| | DVB - T2 | <21 | 22 - 25 | >26 |
| Television – satellite | DVB - S | <7 | 8 - 10 | >11 |
| | DVB - S2 | <7 | 8 - 10 | >11 |

The table refers to broadcasts with FEC of 2/3 via terrestrial and 2/3 ASTRA & 5/6 Eurobird via satellite and include a margin for variation in transmission conditions and receiver performance. Different FECs require different minimum MER values; consult your meter manufacturer for details.

The installation may suffer from various forms of impairment. On a normal installation, the technician shall aim for a minimum of CCIR Grade 4 for locally modulated analogue services and the appropriate MER or C/N for digital services as stated in tables 3 and 4, unless prior agreement has been made with the Client. Interference may enter the system both through the aerial and as ingress into the components of the system. Where there is interference, all efforts to minimise it shall be made including determining the source and, where appropriate

- the fitting of suitable filters
- re-orientation or repositioning of the antenna
- replacement of antenna
- replacement of inadequately screened components

All systems shall be planned and installed in line with the relevant requirements of BS EN 50083-8 (EMC)

to minimise signal egress/ingress. To this end it should be borne in mind that the following equipment should be used on all new installs and changed, where necessary, on upgrades

- Fully screened amplifiers and associated power supplies compliant with BS EN 50083-2 class A.
- CAI benchmarked cable.
- Screened passive devices including outlet plates, filters and splitters etc should be compliant with BS EN 50083-2 class A.

On some occasions it may be that the interfering field strength is of such a level that even with components complying with BS EN 50083-2 that the signal quality can not be achieved and in this case the source and level of the interfering signal should be determined using a spectrum analyser and the problem reported to the client.

In areas where the interfering field strength is high consideration should be given to the location of system components and, where possible, components should be located such that the building structure is used to attenuate the field strength.

Where it has been necessary, due to high levels of ingress of interfering signal into the architecture of an aerial system, to increase the signal level to the outlet an attenuator should be fitted, at an appropriate point, to reduce the signal level back to the figure given in paragraph 11.1.

11.3 Use of amplifiers

Amplifiers shall only be used where it is necessary to raise the signal level to overcome loss in cable and passive devices such as taps and splitters. Before considering the use of an amplifier, every step shall be taken to increase the signal levels received by adjusting the location of the aerial or by using one of higher gain.

Generally where any form of amplification is used filtering will be required to stop the amplifier overloading, this may be a separate unit before the amplifier or built in. It is an EMC requirement and a matter of good practice dictates that the bandwidth of the installed system should be limited to the channels required from the transmitters, however economics often limit the type of filter used and depending upon the current level of interfering signal being received by the aerial, a filter may not be necessary.

When choosing any amplifier the following criteria should be considered:-

- Noise figure.
- Maximum output capability.
- Gain.
- Bandwidth and out of band filtering.
- Screening of both amplifier and associated power supply.
- Durability to weather conditions if to be fitted externally.
- EMC conformity to BS EN 50083-2 (refer to section 1.5).

Where an existing amplifier is found to be unnecessary it should be removed and replaced with a suitable passive device or connector. Where that

device is external to the property it shall be weatherproof.

11.3.1 Active aerials

Where existing aerials are active (i.e. they have integral amplification in the dipole housing) it may be necessary to replace the aerial to avoid overload of that amplifier. However some active aerials are designed to become passive devices by removing the power. In this case a separate masthead amplifier with a filter fitted between the aerial and the amplifier may be required.

11.4 Fitting of filters

If an amplifier is fitted on a system any filter required should be positioned in front of it in order to prevent overload and if external to the property should be weatherproof.

Where a DTT signal passes through a set top box (satellite receiver for example) the filter should be fitted before the modulator of the STB in order to prevent overload of the amplifier built into the modulator. On a simple system where the DTT signal cable comes straight from the aerial this may easily be fitted in the DTT fly lead before the STB.

When a filter is fitted to an aerial system the insertion loss of the filter shall be taken into account when calculating level at the outlet.

11.5 Combined Filters & Levellers and Channelised Amplifiers – Systems

Many MDU and commercial systems already have some form of filtering installed at the headend in the form of passive cluster levellers, active programmable filters or channelised amplifiers. Passive cluster levellers may well offer enough protection from external interference and, depending upon the position of the filtering within active programmable filters or channel amplifiers these units may also offer adequate protection. Where filters are mid-stage it is possible the pre-amplifier of the unit may overload. If a masthead pre-amplifier is in place before any of these units then any filtering required should be fitted before it. The engineer should ascertain what extra filtering, if any, is required.

11.6 Multiswitches

Where a multiswitch is used with active terrestrial a suitable filter should be fitted before the terrestrial input to the switch

11.7 Fibre Systems

With certain types of fibre system, which employ the use of an Out Door Unit (ODU) that combines terrestrial services with satellite for distribution down a single fibre, out of band signals can create overload in the ODU and should be attenuated by the use of suitable filtering to such a level as not to create a problem.

11.8 Choice of Remodulation Channel

In the case of locally modulated programmes or where the signal passes through a set top box and/or

where a set top box is used for the reception of programs the remodulated channel would best be chosen from the range 21 to 60 for digital programmes and definitely for analogue in order to avoid LTE interference.

12 SIGNAL MEASUREMENT / SYSTEM LIMITS - Satellite

See relevant sections in Codes of Practice 1 and 2.

13 CABLE AND WIRING

13.1 General Cabling Requirements

See relevant sections in Codes of Practice 1 and 2.

13.2 Cable Connections

It is imperative that, in order to minimise any interference ingress all connections be properly made and to this end shall be fitted according to the manufacturer's instructions. The correct connector shall always be used for the cable being used and the use of screw-on connectors shall be avoided. External cable connections shall be made in such a manner as to prevent any ingress of moisture to either the cable or the component to which it is connected. External cables shall always enter terminal or junction boxes in an upward slope so that any water drains away from the point of entry. Terminations shall be adequately weather proofed.

Cable joints shall be avoided wherever possible. However, where a join is imperative, it shall be made with a recognised type of coaxial connector. Terminations shall be mechanically and electrically sound and should comply with BS EN 50083-2 grade A.

Cables shall not be terminated directly to, or by means of, a different metal where there is a possibility of electrolytic corrosion.

Cable connections shall not be made in a way that exerts strain or pressure on the cable or termination.

14 COMPLETION OF INSTALLATION

14.1 Reporting of Final Installation

On completion of the installation, a report, including appropriate signal levels and quality, shall be produced and kept for CAI auditing process. This should include a completion certificate for the Client's signature. Standard CAI reporting forms are available from the CAI office – see Appendix A.

15 SYSTEM SAFETY

In the case that it was necessary to change outlet plates from un-screened isolated to non-isolated fully screened and in the case where outlet plates are not used account should be made of the number of interconnected devices in accordance with the separate CAI Code of Practice 03 – "Electrical Safety Requirements for Signal Reception Systems (excluding CATV)".

16 STANDARD CONDITIONS OF TRADING

An inclusion should be made in Members' Conditions of Trading to the effect that every effort will be made to mitigate interference caused by whatever source but the Member cannot be held responsible for factors outside their control. A copy of the latest version of the suggested Standard Conditions of Trading may be downloaded from the CAI website.

Disclaimer

The Conditions suggested are provided as an example only and it is not intended that Members should rely on these Conditions and adopt them entirely as their own, without first obtaining legal advice. Each Member may have different circumstances necessitating different conditions and some of the clauses contained within the standard conditions may not be appropriate for every Member Company.

As an example, these conditions include an arbitration clause that commits both the Company and the Client to arbitration to determine any dispute or difference between them. This then means that the parties are not at liberty to pursue such a matter through the courts. Some Members may prefer to resolve matters through the courts without first either using arbitration or may prefer to have the ability to use the court procedure if the outcome of arbitration is unsatisfactory. We do, however, recommend arbitration.

The CAI will not be held liable for any Member adopting these standard Conditions as their own. The CAI do not represent or warrant that the terms and conditions comply with the Unfair Contract Terms Act 1977 (or any re-enactment thereof or any supplemental regulations) or Trading Standards' requirements nor that they are the most appropriate conditions for each Member Company or organisation.

17 CUSTOMER CARE

The CAI has issued a Code of Conduct booklet to which all Members shall adhere.

STANDARD JOB SHEET

A. N. OTHER AERIALS

INSTALLATION/SERVICE REPORT FORM

| |
|----------------|
| No. |
| Date Attended: |
| Arrival Time: |
| Dept. Time: |
| Time Taken: |

Customer Name:
Address:
Tel: (H) (W) (M)

| | | | | | | |
|----------------------------------|-----------|------|-------|---------|---------|--------|
| Type of Call: Terrestrial | Satellite | CCTV | Other | Install | Service | Survey |
|----------------------------------|-----------|------|-------|---------|---------|--------|

Job Description: (Est. Price -)

I agree that this is the work required and am happy to have a survey completed, which will be charged at £XX if I do not have the work completed today. Customer Signature:

Final price plus VAT: Quote left, call-out & survey fee charged **See below for cancellation rights.**

Engineers report:

System Earthing

Already earthed

Earthed, certificate issued

Earthing not required, certificate issued

Service Complete Yes/No Outstanding Work/Engineers Recommendations

| Levels/Ratios | Ch. No. | | Before | | After | |
|------------------|------------|-------|--------|-----|-------|-----|
| | Before | After | Level | MER | Level | MER |
| Transmitter | | | | | | |
| PSB1 BBC | | | | | | |
| PSB2 ITV | | | | | | |
| PSB3 HD BBC | | | | | | |
| Com 4 SDN | | | | | | |
| Com 5 Arqiva | | | | | | |
| Com 6 Arqiva | | | | | | |
| Local Mod. 1 | | | | | | |
| Local Mod. 2 | | | | | | |
| Local Mod. 3 | | | | | | |
| Local Mod. 4 | | | | | | |
| Local Mod. 5 | | | | | | |
| Satellite (28 E) | | | Level | MER | Level | MER |
| Tp 41 | 10.714 GHz | H | | | | |
| Tp 42 | 10.729 GHz | V | | | | |
| Tp D11S | 11.662 GHz | H | | | | |
| Tp D12S | 11.681 GHz | V | | | | |
| Tp 25 | 12.187 GHz | H | | | | |
| Tp 26 | 12.207 GHz | V | | | | |
| Tp F3U | 12.643 GHz | H | | | | |
| Tp F2U | 12.650 GHz | V | | | | |

Engineer Name:
Invoice Number:
Customer sign & print on completion to satisfaction

Conditions of Trading
Please ask to see our full Conditions of Trading, which are printed on the reverse of any invoice

Notice of Right to Cancel
The customer has a right to cancel this contract if he/she wishes and this can be exercised by delivering, or sending (including by electronic mail), a **WRITTEN CANCELLATION NOTICE** to the company whose details are provided below, at any time within the period of seven days starting with the day of receipt of this notice. As a proof of postage, we would advise recorded delivery when posting a cancellation. The notice of cancellation is deemed to be served as soon as it is posted or sent to the trader, this also applies with electronic communication. You may use our cancellation form if you wish, but your notice of cancellation does not need to be in that format. However, if you decide to cancel the contract you must make your intention clear in any communication.

Cancellation of Contracts made in a Consumer's Home or Place of Work etc. Regulations 2008
I/We agree that A.N.Other Aerials may start work on before my/our cancellation period has expired
I/We understand that if I/We decide to cancel within 7 days, I may be asked to pay for any work that has been carried out prior to cancellation.
Name: Signed: Date:

A.N.OTHER AERIALS, ANY ROAD, ANYTOWN

DANGEROUS SITUATION REPORT

To be used by an engineer to inform a Client of a dangerous situation that the engineer feels needs rectifying, either by himself or a third party. This form enables the engineer to complete his work and also exonerates him if the Client does not wish the situation to be made safe. A copy of this form should be kept for your records and a further copy sent to the CAI office.

| | | | |
|--|---------------------------------|--|-----------------------------|
|  | | <h2 style="text-align: center;">CAI <i>Dangerous Situation</i> Report</h2> <p style="text-align: center;">For reporting an observed dangerous situation.</p> | |
| <p>Please complete all the unshaded areas.</p> | | Job No. <input type="text"/> | |
| | | Page <input type="text"/> of <input type="text"/> | |
| | | Date <input type="text"/> | |
| Owner/Occupier/Client <input type="text"/> | | | |
| Address <input type="text"/> | | | |
| | | Postcode <input type="text"/> | |
| Site address if different <input type="text"/> | | | |
| | | Postcode <input type="text"/> | |
| Inspector <input type="text"/> | Member No. <input type="text"/> | Signature <input type="text"/> | |
| <p>To the owner/occupier/client: A dangerous situation has been observed. It is recommended that this is rectified immediately/made safe until remedial works can be undertaken. Details of the dangerous situation are recorded below.</p> | | | |
| Defect details | | | |
| <input style="width: 100%; height: 100%;" type="text"/> | | | |
| I have been informed of this dangerous situation | | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| I give my permission to make the dangerous situation safe <i>(in not agreeing to make safe I understand that I take responsibility)</i> | | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| Owner/Occupier/Client <input type="text"/> | Signature <input type="text"/> | | |
| Method of making safe <input type="text"/> | | | |

LIST OF RELEVANT STANDARDS AND OTHER REFERENCE DOCUMENTS

1 BS EN 50083/60728 Series

Cabled distribution systems for television, sound and interactive multimedia signals.

BS EN 50083-2:2012
Part 2: Electromagnetic compatibility for equipment.
BS EN 50083-8 2002 + A11 : 2008
Part 8: Electromagnetic compatibility for networks.
BS EN 50529-2-2010 EMC standard
Part 2 Wire-line telecommunications networks using coaxial cables
BS EN 60728-3:2011
Part 3: Active wideband equipment for coaxial cable networks.
BS EN 60728-4:1999
Part 4: Passive wideband equipment for coaxial cable networks.
BS EN 60728-5:2009
Part 5: Headend equipment.
BS EN 60728-6:2011
Part 6: Optical equipment.
BS EN 60728-11:2010
Part 11: Safety requirements

2 EN 50117 Series

Coaxial cables used in cabled distribution networks.

BS EN 50117-1:2002
Coaxial cables. Generic specification Coaxial cables used in cabled distribution networks. Sectional specification for outdoor drop cables for use in networks operating at frequencies between 5 MHz and 2150 MHz.

3 Miscellaneous Standards and Regulations

BS EN 60065:2002
Electrical Safety requirements for Audio, video and similar electronic apparatus.

BS 5640-1:1978
Aerials for the reception of sound and television broadcasting in the frequency range 30 MHz to 1 GHz. Specification for electrical and mechanical characteristics.

BS 5640-2:1978
Aerials for the reception of sound and television broadcasting in the frequency range 30 MHz to 1 GHz.

Methods of measurement of electrical performance parameters.

Building Regulations Part P Electrical Safety.

ETSI Document ETR290
Measurement Guidelines for DVB Systems.

BS and BS EN standards are available from the British Standards Institution.

4 Other Reference Documents

CAI Code of Practice 01
Installation of Terrestrial and Satellite TV Reception Systems (MDU & Commercial)

CAI Code of Practice 02
Installation of Aerials/Antennas and Receiving Equipment in the SDU (Single Dwelling Unit).

CAI Health and Safety in the Aerial and Satellite Industries.

CAI Guidelines on Safe Operating Procedures.

CAI Code of Conduct.

CAI Method Statements and Risk Assessments.

CAI Code of Practice 03
Electrical Safety Requirements for Signal Reception Systems (excluding CATV).

CAI Aerial Benchmark Specification.

CAI Cable Benchmark Specification.

DTG R-book 5
Installing Digital Television (MATV and IRS), available as a download from the DTG website.

Ofcom Communications Act 2003, available from:-

www.legislation.gov.uk/ukpga/2003/21/contents

Environment Agency for Waste Carriers Registration

www.environment-agency.gov.uk/business/sectors/wastecarriers.aspx
VCA for information regarding Waste Electrical and Electronic Equipment (WEEE)

www.vca.gov.uk/enforcement/weee-enforcement.asp

Note: The above URLs were correct at the time of printing.

