

members of the Congress that enacted it to understand confounds the courts. It is even less surprising that members of the public will behave in accord with their sense of what the rules ought to be in preference to deciphering an entire volume of the United States Code. If the private parties who negotiate copyright legislation among themselves cannot come up with bills that look as if they were drafted by members of Congress to embody general principles rather than like a web of interdependent bilateral and trilateral deals, the bills they do come up with are unlikely to work very well in practice. Technology will develop, and statutory provisions will grow obsolete with breathtaking speed.

Current stakeholders may prefer today's world or, indeed yesterday's world, to tomorrow's. They may, understandably, prefer a copyright law that forces tomorrow's players to order their business by today's rules. They may even be the beneficiaries of a legislative process that allows them to create a copyright law that meets that specification. They cannot, however, force time to stop. Representatives of affected interests insist that they want a workable copyright law. They could use the familiar process to produce one. They need only do what Congress seems to be unable to do for them: draft a law that balances elastic rights with comparably elastic, flexible limitations.

APPENDIX 4.—TECHNICAL REFERENCE DOCUMENT FOR THE AUDIO HOME RECORDING ACT OF 1991

Introduction

This Technical Reference Document is provided to facilitate the implementation of legislation relating to digital audio recording ("DAR") devices, known as the "Audio Home Recording Act of 1991" ("the Act").

This Technical Reference Document establishes the standards and specifications that are necessary to implement the Serial Copy Management System ("SCMS") under the Act. It draws in part from specifications proposed to the International Electrotechnical Commission ("IEC") in "IEC 958: Digital Audio Interface" (First edition 1989-03) and "Amendment No. 1 to IEC 958 (1989): Digital Audio Interface, Serial Copy Management System" (Reference 84(CO)126 submitted on June 21, 1991) (collectively, "IEC 958"), and "IEC 60A(CO)136 Part 6: Serial copy management system for consumer audio use DAT recorders". The standards and specifications set forth herein relate only to the implementation of SCMS via digital audio interface signals, DAR devices and digital audio interface devices. The standards and specifications set forth herein, as they may be amended pursuant to an order of the Secretary of Commerce under Section 1022(b) of Subchapter C of the Act, shall be considered determinative under the Act, regardless of any future action by the IEC or by a manufacturer or by an owner of a proprietary technology.

SCMS is intended to prohibit DAR devices from recording "second-generation" digital copies from "first-generation" digital copies containing audio material over which copyright has been

asserted via SCMS. It does not generally restrict the ability of such devices to make "first-generation" digital copies from "original" digital sources such as prerecorded commercially available compact discs, digital transmissions or digital tapes.

Currently, the predominant type of DAR device offered for sale in the United States is the DAT recorder, which records and sends digital signals in accordance with the IEC 958 nonprofessional digital audio interface format. Additional types of DAR devices and interface formats are being or may be developed. The standards and specifications in this Technical Reference Document are not intended to hinder the development of such new technologies but require, in accordance with Section 1021(a)(1)(A)-(C) of Subchapter C of the Act, that they incorporate the functional characteristics of SCMS protection. In order for a DAR device to be "compatible with the prevailing method of implementing SCMS", to the extent DAR devices are capable of recording signals sent in a particular digital audio interface signal format, the SCMS information must be accurately received and acted upon by the DAR device so as to correctly implement the same level of SCMS protection provided by that format. "Compatibility" does not require direct bit-for-bit correspondence across every interface signal format; indeed, particular interface signal formats may be recordable by some, but not all, DAR devices. To the extent that any digital audio interface device translates and sends signals in a form that can be recorded by a particular DAR device, however, "compatibility" requires that the SCMS information also be accurately translated

and sent by the interface device, and accurately read and acted upon by the DAR device.

This document is in three parts. Part I Section A sets forth standards and specifications constituting the functional characteristics for implementing SCMS in digital audio interface signals. Sections B and C then apply these standards and specifications in a specific reference for implementing SCMS in the IEC 958 nonprofessional digital audio interface format. Part II Section A similarly first sets forth standards and specifications constituting the functional characteristics for implementing SCMS in DAR devices. Sections B and C then apply these standards and specifications in a specific reference for implementing SCMS with respect to the recording and play-back functions of non-professional model DAT recorders. Part III contains a series of charts that apply and correlate those codes that are mandated for implementation in DAT recorders by Parts I-C and II-C of this document.

The terms "digital audio interface device," "digital audio recording device," "digital audio recording medium," "distribute," "professional model," and "transmission" as used in this document have the same meanings as in the Act. "Generation status" means whether the signal emanates from a source that has been produced or published by or with the authority of the owner of the material, such as commercially released pre-recorded compact discs or digital tapes or a digital transmission (referred to herein as "original");

or whether the signal emanates from a recording made from such "original" material.

PART I. IMPLEMENTATION OF SCMS IN DIGITAL AUDIO INTERFACE FORMATS

Various consumer devices are capable of producing digital audio signals. Currently, for example, compact disc players, DAT recorders and analog-to-digital converters can send digital audio signals; future devices may include digital microphones or recordable compact disk devices. To enable communication between these different types of devices and a DAR device, it is necessary and desirable to establish common protocols or "interfaces" that mandate specific information in the digital audio output signal of each device. Digital signal interfaces may enable communication of different types of data. A "digital audio interface signal" communicates audio and related interface data as distinguished from, for example, computer or video data. Digital audio interface signal formats may be established for particular types of devices or uses. For example, interface protocols may exist for broadcast use, or for users of professional model products ("professional interface") or for nonprofessional model products ("nonprofessional interface"). One such set of protocols already has been established in the document IEC 958. Sections B and C of Part I summarize and mandate the implementation of SCMS in the IEC 958 nonprofessional interface.

Section A sets forth the standards and specifications for implementing SCMS in digital audio interface signals and devices.

A. Digital Audio Interface Standard

To implement the functional characteristics of SCMS in nonprofessional digital audio interface signal formats, whether presently known or developed in the future, the following conditions must be observed:

1. The digital audio interface format shall provide a means to indicate:

(a) Whether or not copyright protection is being asserted via SCMS over the material being sent via the interface; and,

(b) Whether or not the generation status of the material being sent via the interface is original.

2. If the digital audio interface format has discrete professional and nonprofessional modes, the interface format and digital audio interface devices shall indicate accurately the professional or nonprofessional status of the interface signal. Such indication is referred to generically as a "channel status block flag".

3. If the interface format has a discrete mode for sending data other than audio material, the interface format shall indicate accurately whether or not the interface signal contains audio material.

4. If a digital audio interface device is capable of combining more than one digital audio input signal into a single digital audio output signal, and if copyright is asserted via SCMS over the material being sent in at least one of the input signals,

then the device shall indicate in the output signal that copyright is asserted over the entire output signal. If copyright protection is asserted via SCMS over any of the input signals, and the generation status of that copyright-asserted signal is not original, then the entire output signal shall indicate that copyright is asserted and that the generation status is not original.

5. Devices that are capable of reading original recordings and/or DAR media, and that are capable of sending digital audio signals that can be recorded by a DAR device, shall accurately read the copyright and generation status information from the media and accurately send that information.

6. Devices having a nonprofessional digital audio interface shall receive and accurately send the copyright and generation status information.

7. Professional devices that are capable of sending audio information in a nonprofessional digital audio interface format shall send SCMS information as implemented for that format. However, nothing shall prevent professional devices and/or recording professionals engaged in a lawful business from setting SCMS information according to the needs of recording professionals.

8. If the audio signal is capable of being recorded by a DAR device and the interface format requires an indication of the type of device sending the signal via the interface, then the device shall send the most accurate and specific designation applicable to

that device; for example, "Category Codes" as set forth in Part I with reference to the IEC 958 nonprofessional interface.

9. Devices that receive digital audio transmissions sent without copyright and generation status information shall indicate that copyright is asserted over the transmitted audio material and that the generation status is original. If the transmitting entity wishes to transmit copyright status information it shall do so accurately, and the information shall accurately be received and sent unaltered by the receiving device. In the case of Electronic Audio Software Delivery signal transmissions, the receiver shall accurately receive generation status information as sent by the transmitting entity so as to permit or restrict recording of the transmitted signals. "Electronic Audio Software Delivery" refers to a type of transmission whereby the consumer interactively determines what specific work(s) and/or event(s) are received. This includes, for example, "audio on demand" (electronic selection and delivery of sound recordings for copying) or "pay-per-listen" reception, as distinguished from regular broadcast or comparable cable radio programming services.

10. (a) If the digital audio portion of an interface signal format is recordable by a "pre-existing" type of DAR device, i.e., one that was distributed prior to the distribution of the interface signal format, then the signal format shall implement the rules of SCMS so that the pre-existing DAR device will act upon the rules of SCMS applicable to that DAR device.

(b) If a type of DAR device is capable of recording the digital audio portion of signals sent by a pre-existing digital audio interface device, then the DAR device shall implement the rules of SCMS so that the DAR device will act upon the rules of SCMS applicable to that pre-existing digital audio interface device's format.

(c) If a digital audio interface device is capable of translating a signal from one interface format to another, then the device also shall accurately translate and send the SCMS information.

B. Summary of SCMS Implementation in the IEC 958 Digital Audio Interface

Under IEC 958, SCMS is implemented via inaudible information, known as "channel status data", that accompanies a digital audio signal being sent to or by a DAR device via a nonprofessional digital audio interface. Like all digital data, channel status data consist of numerical information encoded as a series of zeros and ones. Each zero or one constitutes a "bit" of data in which both zero and one may impart information concerning the composition of the audio signal being sent to or by a DAR device. Bits represented in this Technical Reference Document as "X", rather than as zero or one, indicate that those bits may be either zero or one without affecting the specifications set forth herein.

Channel status data bits are organized into units of information, known as "blocks," relating to both the left and right stereo audio channels. Each block contains 192 bits of information, numbered consecutively from 0 to 191. Those channel

status bits that are significant to the implementation of SCMS via the IEC 958 interface are included within channel status bits 0 through 15. Certain of these 16 bits identify professional or nonprofessional interfaces; some specify copyright assertion; and some identify the generation number of a recording. The remaining bits are "Category Codes" that describe the type of device sending the digital audio signal. More complete descriptions of these channel status bits are set forth in the remaining sections of this Part I.

IEC 958 defines professional and nonprofessional interface formats for digital audio signals. An IEC 958 professional interface contains particular types of channel status data for such digital audio recording devices as would be used in professional model products. An IEC 958 nonprofessional interface contains different types of channel status data. The channel status data sent in a nonprofessional interface are incompatible with the channel status data in a professional interface; a DAR device cannot correctly read the channel status data sent in a professional interface.

The specifications summarized herein and mandated in Section C apply only to devices that send or read an IEC 958 nonprofessional interface signal. To the extent that a professional device also may have a IEC 958 nonprofessional interface, such a professional device must be capable of sending channel status data via its nonprofessional interface in accordance with the standards set forth herein. However, nothing in this

Technical Reference Document shall be interpreted to prevent a professional device having an IEC 958 nonprofessional interface and/or recording professionals engaged in a lawful business from permitting such channel status data bits to be set in accordance with the needs of recording professionals.

All devices having a digital audio output capable of supplying a digital audio signal to a DAR device through an IEC 958 nonprofessional interface must implement five types of codes located between Channel Status Bits 0 and 15. For the IEC 958 interface format, Channel Status Bits 0 through 15 are supplied in a digital audio output signal to a DAR device as follows:

1. Bit 0. Bit 0 (the "Channel Status Block Flag"), one of the "Control" bits, shall identify whether the channel status bits are for a professional or nonprofessional interface. Where Bit 0 is set as "1", the signal contains the channel status data required for a professional interface. Where Bit 0 is set as "0", the channel status data is suitable for a nonprofessional interface. The remaining bit assignments are mandated only with respect to a nonprofessional interface, *i.e.*, where Bit 0 is set as "0".

2. Bit 1. Bit 1, another of the "Control" bits, shall identify whether the signal being sent to or by the DAR device is a digital audio or a digital data signal. Where Bit 1 is set as "0", the signal is a digital audio signal. Where Bit 1 is set as "1", the signal is a digital data signal.

3. Bit 2. Bit 2 (the "C" Bit), another of the "Control" bits, shall identify whether copyright protection is asserted for

the audio material being sent via the digital audio signal. Where the C Bit is set as "0", copyright protection has been asserted over the material being sent to the digital audio input of the DAR device. Where the C Bit is set as "1", either that material is not protected by copyright or no copyright protection has been asserted by the owner of that material.

There are specific applications of the C Bit for three types of devices, as follows:

-- Compact disc players compatible with the standards set forth in IEC 908 (compact disc standard, Category Code 10000000) in effect as of the date of enactment of the Act indicate in the C Bit both the copyright and generation status of the signal. (See description of "Bit 15", *infra*.) Where the signal is original and copyright protection has been asserted, the C Bit = "0". Where no copyright protection has been asserted, the C Bit = "1". Where the signal is first-generation and copyright protection has been asserted, the C Bit will fluctuate between "0" and "1" at a rate of between 4-10 Hz.

-- Digital Receivers (Category Codes 001XXXXL and 0111XXXL) shall set the C Bit as "0", except that these devices shall send the C Bit as "1" only where the cable operator, broadcaster or other entity specifically transmits information indicating that no copyright protection has been asserted over the material.

-- Devices that combine digital audio input signals into one digital audio output signal (*s.g.*, digital signal mixing

devices) shall reflect whether copyright protection has been asserted in the C Bit for at least one of the input signals by setting the C bit as "0" in the resulting digital audio output signal.

Devices in the Category Codes for General ("00000000") and Present A/D Converters ("01100XXX") are not capable of sending copyright status information in the C Bit. The C Bit in the channel status data sent by these devices has no meaning.

There is no existing legal requirement that a copyright owner must assert protection over its material (and, therefore, set the C Bit as "0"). However, except as provided herein with respect to implementation in Digital Receivers (category codes 001XXXXL and 011XXXXL), a copyright owner may not set the C Bit as "0" for material that is not copyrighted or is in the public domain.

4. Bits 3-7. These bits are sent to and read by a DAR device, but specific bit settings for Bits 3-7 are not necessary for the implementation of SCMS. (Bits 6-7 are Music Production Program Block ("MPPB") flag bits.)

5. Bits 8-14. Bits 8-14 shall specify a "Category Code" that identifies the type of device that produces the digital audio signal sent to or by a DAR device. Using various combinations of zeros and ones, Bits 8-14 can define Category Codes for as many as 128 different devices that can provide digital audio signals to a DAR device. According to IEC 958, the first three to five Category Code bits (numbered Bits 8-10 through 8-12) describe general product groups, and the remaining Category Code bits specify

particular devices within each product group. IEC 958 has assigned particular Category Codes to existing and anticipated product groups and devices, and has reserved additional Category Codes for future devices.

The Category Code issued by each particular device must reflect the most specific code applicable to that device, with the following exceptions:

-- Digital signal processing and mixing products receive digital audio signals from one or more sources and either process or combine them with other incoming digital audio signals. If all input signals come from analog-to-digital converters having a Category Code "01100XXX", these devices should issue the Category Code of an analog-to-digital converter rather than of the digital signal processing or mixing device.

-- Sampling rate converters and digital sound samplers come under the Category Codes for digital-to-digital converters. If an input signal to a sampling rate converter or digital sound sampler comes from an analog-to-digital converter having a Category Code "01100XXX", the sampling rate converter or digital sound sampler should issue the Category Code of the analog-to-digital converter.

These exception cases will permit two generations of digital copies from analog recordings, which currently is permitted under SCMS.

The relevance of these Category Codes to SCMS as implemented for devices having the IEC 958 nonprofessional interface is

