**Before the**
# National Telecommunications and Information Administration
**Washington, D.C. 20230**

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| **Coupon Program for Digital-to-Analog Converter Boxes** | ) | Docket No. 060512129-6129-01 |

## COMMENTS OF THAT CORPORATION

## I. INTRODUCTION

THAT Corporation ("THAT"), by counsel, hereby submits its comments in response to the National Telecommunications and Information Administration ("NTIA") Notice of Proposed Rulemaking ("Notice")[1] seeking comments in the above-captioned proceeding on the implementation of the digital-to-analog converter box coupon program which was specified in the Digital Television Transition and Public Safety Act of 2005 (the "Act").[2]

THAT applauds NTIA's effort to ensure that viewers who use analog television sets will continue to be able to receive television programming after the digital transition is complete in 2009. Specifically, THAT agrees with NTIA that the appropriate minimal technical standard for converter boxes should preserve the existing analog television color picture and stereo audio quality. In this regard, THAT believes that converter boxes purchased through the coupon program should, as much as reasonably possible, duplicate the current consumer experience of analog television broadcasts. This means that consumers should be able to display digital TV ("DTV") pictures in color on their existing analog TV sets as well as listen to sound in stereo. In order to ensure that this public policy goal is met, THAT urges NTIA to specify the National

[1] Request for Comment and Notice of Proposed Rules to Implement and Administer a Coupon Program for Digital-to-Analog Converter Boxes, 71 F.R. 42067, July 25, 2006.
[2] *See* Title III of the Deficit Reduction Act of 2005, Pub. L. No. 109-171, 120 Stat. 4, 21 (February 8, 2006).

Television System Committee ("NTSC") picture standard plus the Broadcast Television System Committee ("BTSC") stereo audio standard as the minimum technical standards for coupon-purchased set-top boxes. THAT believes that both these standards are required to ensure that consumers will continue to receive television programming without any degradation in picture and audio quality after the digital transition date in 2009.

## II. BACKGROUND

The United States is well on its way toward the implementation of digital television. On February 18, 2009, analog television will be turned off and television will be broadcast only in a digital format. This migration will provide consumers with a vastly improved television service. Since the introduction of digital television was first discussed in the 1980s, one of the pressing issues presented was ensuring that this transition did not impair the television experience for the U.S. public after the analog signal was turned off. Specifically, the FCC recognized that after the analog turn-off-date, many analog televisions would remain in use.[3] In order to ensure that these televisions could continue to operate, set-top boxes are being developed to convert digital signals to analog signals. In 2006 Congress mandated NTIA to implement and administer a program to provide $40 coupons to consumers for use toward the purchase of digital-to-analog converter boxes.[4] This legislation was designed to assist in the preservation of television services for those using analog televisions after February 18, 2009. On July 25, 2006, the Notice was published in the *Federal Register* and public comment was sought on the proposed coupon program.

THAT Corporation's interest in this proceeding is directed to the minimum technical requirements for the converter boxes eligible for purchase with the $40.00 coupon. THAT and its predecessor company, dbx, Inc. ("dbx") have a long history in audio signal processing

[3] *See* Sixth Report and Order in MM Docket No. 87-268, 12 FCC Rcd. 14588 (1997).
[4] *See* Note 2, *supra*.

especially as it relates to stereo audio for television sets. Though dbx, THAT was actively involved in the development of the BTSC[5] standard for multichannel TV sound. THAT currently markets and licenses BTSC products as well as other technologies useful in the production, transmission, and reception of TV audio signals. As one of the major parties involved in the BTSC and the standard that resulted from that committee's work, THAT has an unique perspective on the technical requirements associated with providing at least two-channel audio in the proposed converter boxes. THAT believes it is essential that the NTIA consider the role of BTSC in maintaining stereo sound on analog sets after the DTV transition, just as it has apparently already considered the role of NTSC[6] in maintaining color video on analog sets.

In the Notice, NTIA proposes to establish a minimum technical standard for converter boxes that ensures that there is no diminution in picture and audio quality to consumers taking advantage of the coupon program.[7] In order to facilitate this goal, NTIA proposes that the converter box should "deliver NTSC composite video and stereo audio to drive NTSC monitors."[8] It further states that "the outputs shall be channel 3 or 4 (NTSC modulated signals), composite video (NTSC baseband), and audio (stereo)."[9] THAT applauds NTIA's proposal to

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[5] "BTSC" derives from the Broadcast Television Systems Committee, an industry group convened in the late 1970s that, primarily, added additional audio channels to NTSC, allowing stereo (left and right) audio and a second audio program (SAP) channel to be broadcast. BTSC transmissions were compatible with NTSC transmissions in that an NTSC receiver would receive the original monaural channel, while BTSC receivers would receive stereo and SAP audio. In 1983 the BTSC completed its work and adopted the stereo audio TV standard. The following year the FCC developed rules and specified a pilot tone for BTSC. *See* Second Report and Order, Docket No. 21323, §§ Rad. Reg. 2d (P&F) 1642 (1984). The specifications for BTSC standard were subsequently published by the FCC. *See* Multichannel Television Sound Transmission and Audio Processing Requirements for the BTSC System in OET Bulletin No. 60, Revision A, February 1986.

[6] "NTSC" derives from the National Television Systems Committee, an industry group convened in the early 1950s that, primarily, added a color subcarrier to the previous broadcast television format to allow color transmissions that were compatible with the previous monochrome (black & white) system. Monochrome sets would receive color signals in black & white, while new color sets would recognize the new color information and display it "in living color." Both NTSC and the previous system provided for a single monaural audio channel.

[7] *See* Notice at 12.

[8] *Id*.

[9] *Id*.

maintain picture and sound quality for those consumers who utilize the coupon program to obtain a set-top box. In these comments, THAT suggests additional technical specifications to ensure NTIA's goal to maintain analog television quality articulated in the Notice is met.

## III. NTIA SHOULD ADOPT RULES AND POLICIES THAT ENSURE THAT THE CONSUMER EXPERIENCE IS NOT DEGRADED WHEN COUPON-SUBSIDIZED CONVERTER BOXES ARE USED

Pursuant to the Act, NTIA has been tasked with implementing a digital–to-analog converter box coupon program. In the Notice, NTIA states that "the digital converter box should be able to receive, render and display usable pictures and sound from high definition … broadcast . . . ."[10] More specifically, NTIA proposes minimal technical standards for the converter box. THAT fully supports this apparent intent of NTIA's proposed minimum technical standards. Such standards are fully consistent with the purposes underlying the Act and the entire history of analog television, as well as the more recent digital television proceeding.

### A. The Importance of Maintaining the Television Viewer Experience During the Transition to DTV.

Whenever faced with the introduction of a new technology that will replace an old technology, the question arises: what will the impact of the new technology be on embedded existing technology? Broadcast technologies present a particular vexing question in this regard because of their ubiquity, important public service characteristics, and the need to have a common technical standard for transmission and reception systems. When faced with the introduction of a new broadcast technology, regulators have sought to find means to allow viewers and listeners to continue to utilize existing equipment during the period when the technology was migrating. This was true almost from the inception of broadcast technology, including the introductions of FM stereo radio, AM stereo radio, color television, and

[10] *Id.*

multichannel TV sound. Each of these important new technologies was carefully integrated into the pre-existing technology in a manner that ensured that the quality and availability of pre-existing technology was not impaired. For example, when color was introduced to TV by the NTSC, careful attention was paid to ensuring that existing monochrome sets would continue to receive the new color broadcast signals, albeit displaying the signals in black and white. Likewise, when multi-channel audio was introduced to TV by the BTSC, careful attention was again paid to ensuring that existing monaural sets (color and monochrome) would continue to receive the new multi-channel broadcast signals, albeit delivering only the monaural audio channel.

The introduction of DTV presents a special problem because the analog TV signal will be turned off completely, instantly making obsolete all analog televisions in use at the time. Without taking special measures, following the analog shut-off date of February 18, 2009 many TV viewers would be immediately deprived of the TV viewing to which they have become accustomed. Recognizing this as a serious problem, Congress agreed to implement a program that will promote the use of converter boxes that will allow analog TVs to continue to be utilized after the transition date. These converter boxes will serve as a lifeline to promote a smooth transition from the old analog to the new digital broadcast system.[11]

While seeking a means to protect the utility of existing equipment during a technology transition, the FCC has also sought to ensure that the quality of the existing experience be maintained. Viewer/listeners using existing analog TV sets have come to expect and rely on a certain minimum capability as well as quality of the viewing/listening experience. It is for this reason that NTIA has proposed minimum technical characteristics for converter boxes. NTIA

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[11] *See* Deficit Reduction Act of 2006, Conference Report, December 29, 2005 at 201 ("Conference Report").

states that "the digital converter box should be able to receive, render and display usable pictures and sound from high definition as well as standard definition broadcast; however, the converter box would not be required to render pictures and sound at more than standard definition quality."[12] Thus, it appears that the minimum technical standard for the converter box should specify that the picture and audio quality be equivalent to today's standard definition broadcast analog technology. Since today's TV involves both video and audio, throughout the Notice, NTIA refers to both picture and audio quality when it discusses the technical standards for the converter box.

THAT believes the NTIA is correct in requiring minimum quality standards for both video and audio, and in requiring that the minimum performance standard should be the current level enjoyed by viewer/listeners using the current analog technology.

### B. Stereo Audio is an Integral Part of Today's Analog TV Viewer Experience

Since its adoption in 1984 by the FCC, following the recommendation of the BTSC in 1983, stereo audio has been an integral part of the television signal. When the FCC considered the BTSC stereo audio standard, it called stereophonic sound (as well as second language audio) an "extension of basic television service with the potential to develop as an important component of television program service that is protected by signal carrier rules."[13] The Commission, in a separate order, proclaimed that stereophonic sound (and second language audio) was "part of the basic **[TV]** signal and is required to be delivered by whatever technical means the cable system chooses. . . ."[14] Thus, the FCC embedded the concept of TV stereo audio when it established in

[12] Notice at 11.
[13] The use of Subcarrier Frequencies in the Aural Baseband of Television Transmitters, Second Further Notice of Proposed Rulemaking, 1984 FCC Lexis 2157, FCC 84-361, para. 8, July 26, 1984.
[14] Memorandum Opinion and Order, FCC 85-63, MM Docket 84-168, para. 3, February 8, 1975.

its rules a unique protected pilot tone for the BTSC system of transmitting stereo audio and Second Audio Program (SAP) signals.[15]

THAT believes that the intent of the original Congressional legislation[16] as well as that of the NTIA as evidenced within the Notice, is to maintain for purchasers of the converter boxes the current level of viewing/listening experience as provided using the current analog technology. We interpret this to mean not only color (not black and white) video, but also stereo (not monaural) audio.

## IV. NTIA SHOULD SPECIFY THAT THE CONVERTER BOX SHOULD PROVIDE THE CONSUMER WITH BTSC STEREO AUDIO

### A. Most consumers will use RF, not Baseband, Outputs to connect the Converter Boxes

In support of its goal to maintain the television experience, the Notice proposes the following characteristic for a certified converter box: [17]

- "delivers NTSC composite video and stereo audio to drive NTSC monitors"

In a subsequent paragraph, the Notice elaborates on this delivery system by stating that these outputs should be "composite video (NTSC baseband) and audio (stereo)."[18] Typically, such outputs will be present on three "RCA phono" jacks, one for the composite video and one each for the left and right audio channels. Figure A below shows the back panel of a converter box, including all required connections, with the three phono jacks highlighted.

[15] *See* 47 CFR §§ 73.665, 73.669 and 73.682(c).
[16] *See* Conference Report.
[17] *See* Notice at 12.
[18] *Id.*

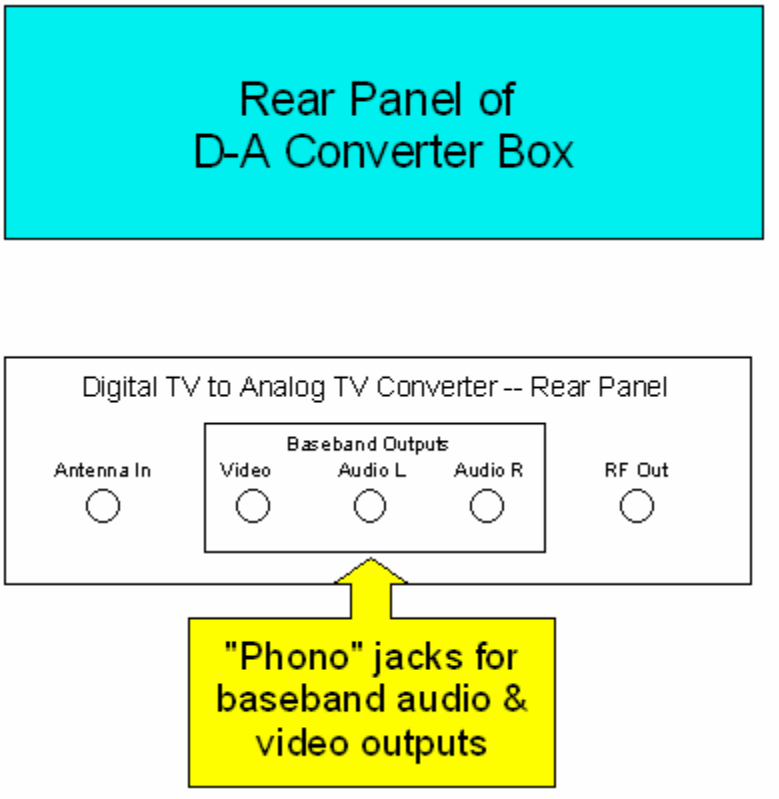


**Figure A**

To utilize these outputs, consumers must be able to connect three separate cables from these converter box outputs to three corresponding inputs on the TV monitor. Figure B shows the back panel of a converter box with an antenna connected to the antenna input, and three cables connected from the phono jacks to the TV set's corresponding inputs.

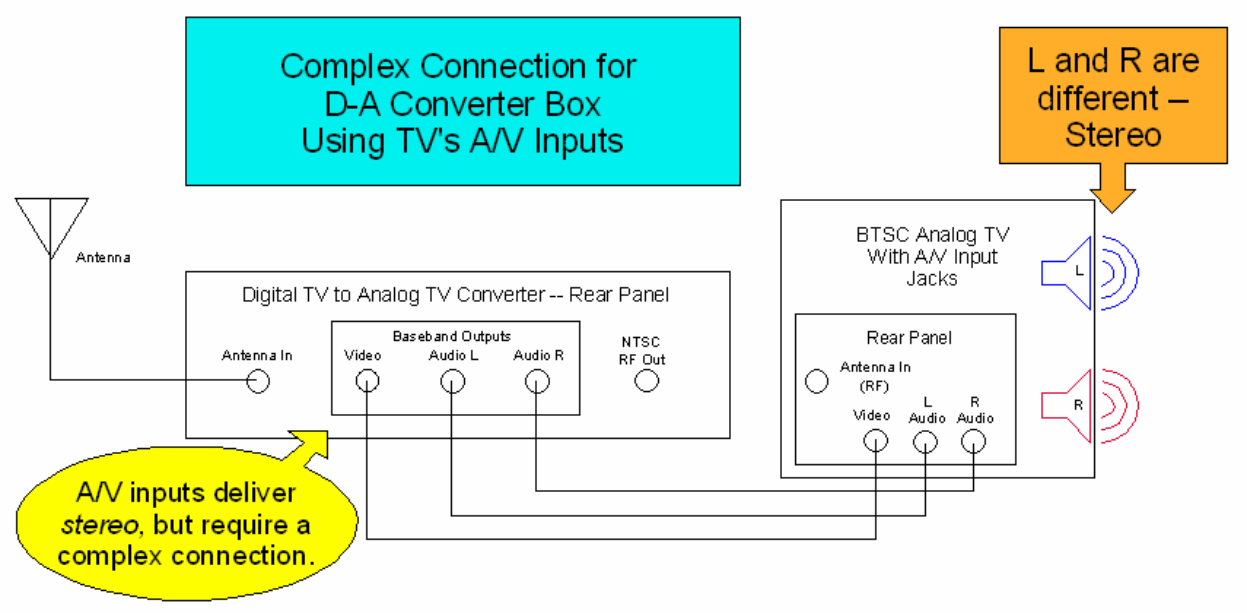


**Figure B**

Provided that the monitor includes these input jacks, this relatively complex connection scheme will deliver stereo to the viewer/listener. But note that such a hookup requires a degree of technical competence lacking in many consumers. Most importantly, receivers which lack left and right audio inputs simply *cannot* be connected in this fashion. Figure C (similar to Figure B) shows TV receivers which lack these jacks. In this situation where no hookup is possible, the resulting sound from the TV set will be monaural.

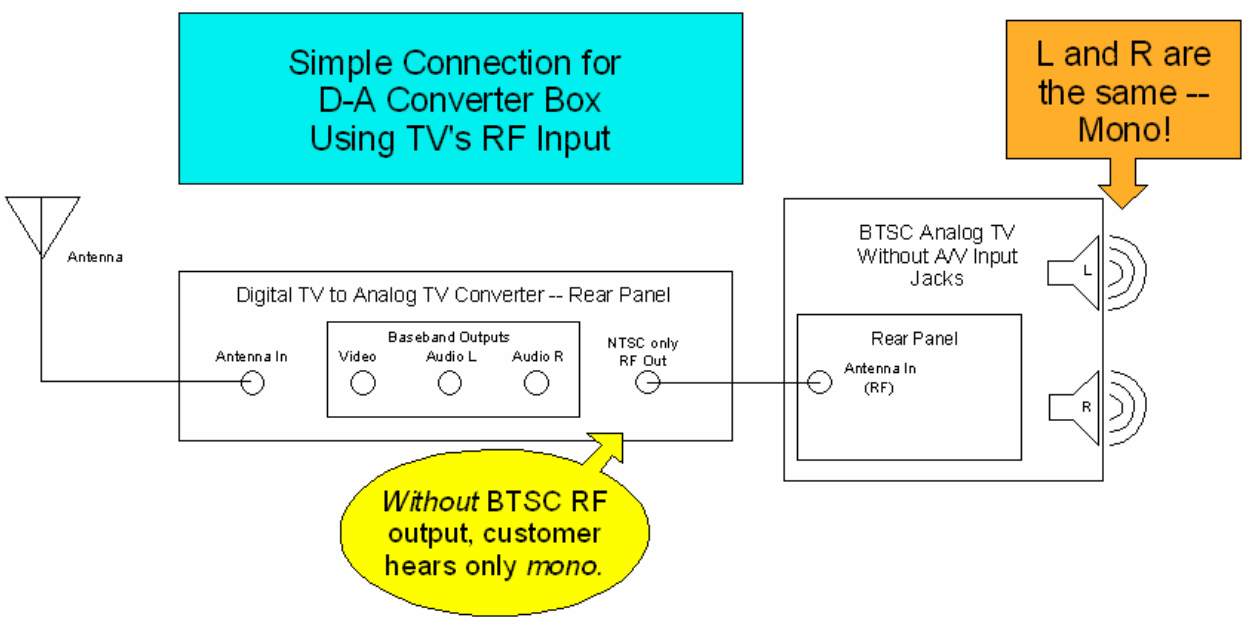


**Figure C**

Such receivers would require additional components, including a stereo amplifier and speakers, to deliver stereo sound to the viewer/listener. This arrangement is shown in Figure D.

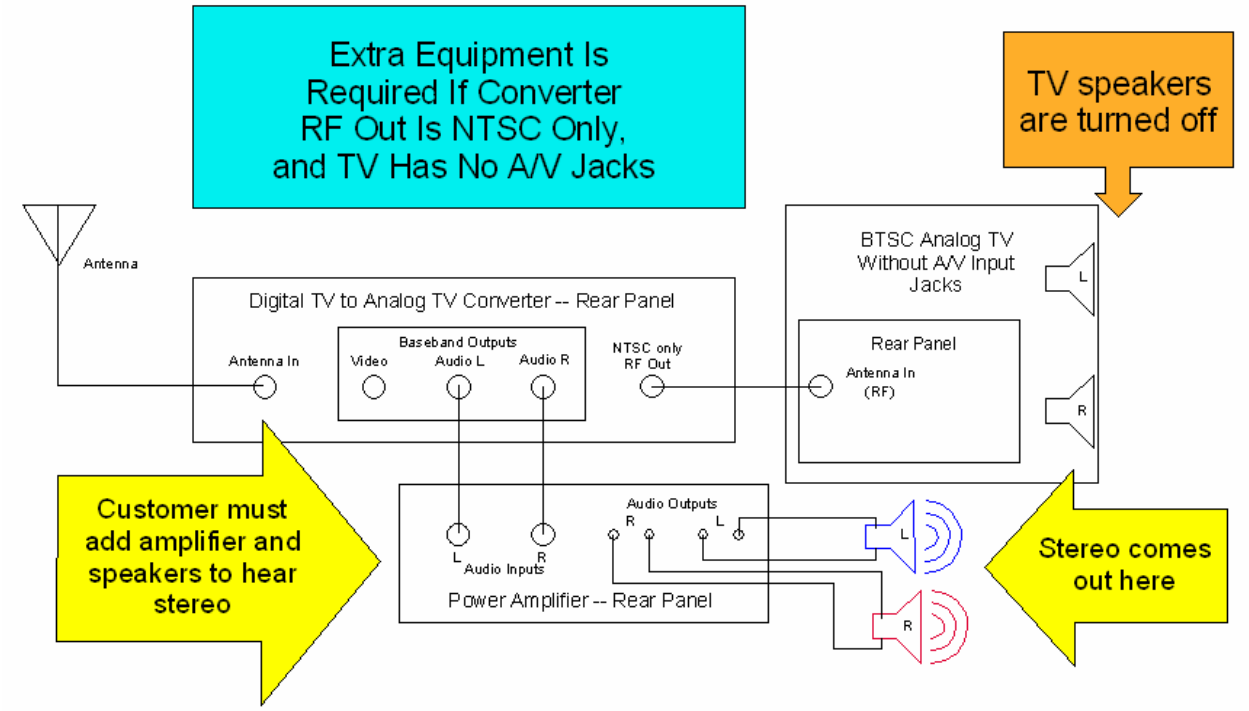


**Figure D**

THAT believes that many television sets lack the baseband video and audio input jacks required to take advantage of the connections specified in II.E.(b) of the Notice.[19] While such television sets are likely in the minority, they form a significant population, especially among older analog televisions. Moreover, for those consumers whose TV sets are equipped with these jacks, THAT believes that most will either choose not to use them or will lack the technical sophistication to make use of them.

Importantly, in subparagraph II.E.(c), the Notice specifies another output that must be included in a certified converter box: one that "delivers channel 3 or 4 switchable (NTSC) RF output for television receivers."[20] In a subsequent paragraph, the Notice elaborates on the RF output mentioned above as follows: "the outputs shall be channel 3 or 4 (NTSC modulated signals)."[21] It goes on to say that "the channel 3 or 4 analog output (type F connector) ensures that older style NTSC analog television receivers can be connected to eligible boxes."[22]

THAT believes that the majority of consumers who purchase the converter boxes will use the above-specified RF output for connection between the box and the TV receiver. This follows from the observation that the consumers who are most likely to rely upon this program to continue to receive over-the-air broadcasting are those who currently receive over-the-air broadcasts. Over-the-air broadcasts, by definition, are received via an antenna or "rabbit ears". Antennae and rabbit ears are universally connected to television sets by means of an RF input connection. Figure E shows current connection to a television set with only an antenna input. Even those TV sets which have audio and video baseband inputs are generally connected to receive signals via the RF input, as shown in Figure E.

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[19] *Id.*
[20] *Id.*
[21] *Id.*
[22] *Id.*

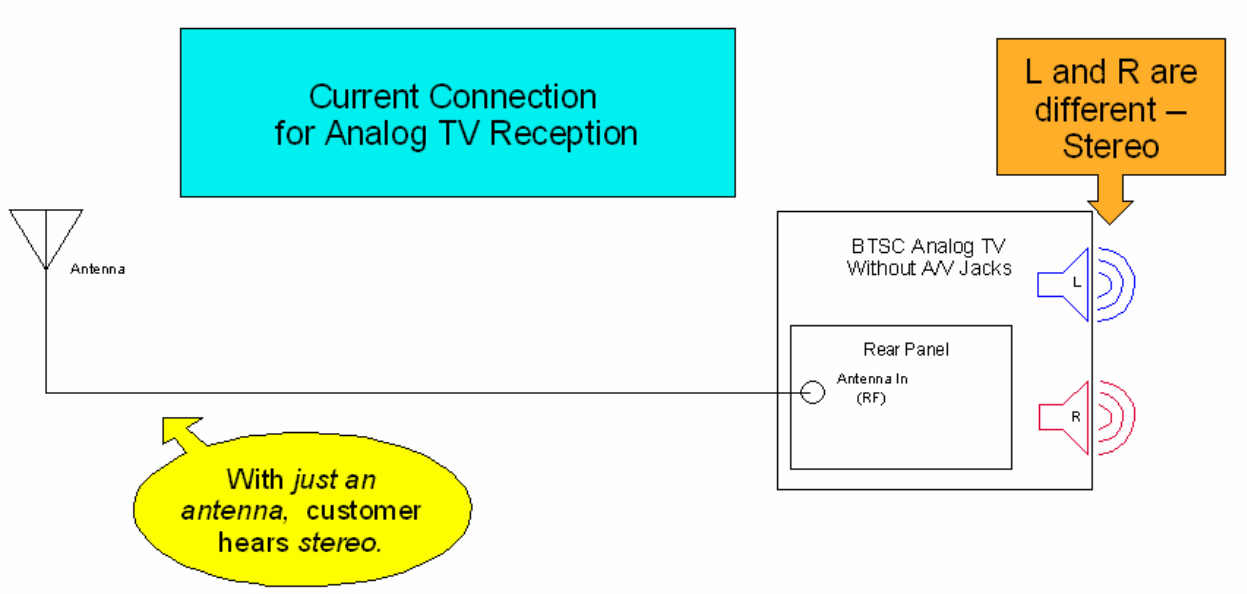


**Figure E**

The Notice states: "the only input of the converter box shall be for an external antenna."[23] NTIA understands that the consumer's existing antenna or rabbit ears will be effective, and thus will be used for receiving the new DTV signals. Thus, consumers will disconnect their existing antenna or rabbit ears from the antenna input in their existing television set, and re-connect the antenna or rabbit ears to the input of the converter box. The simplest and most logical next step is to connect the RF output of the converter box to the antenna input on the television set. Figure F shows the converter box connected to the antenna of Figure E, and the RF output connected to the television antenna input.

[23] *Id.*

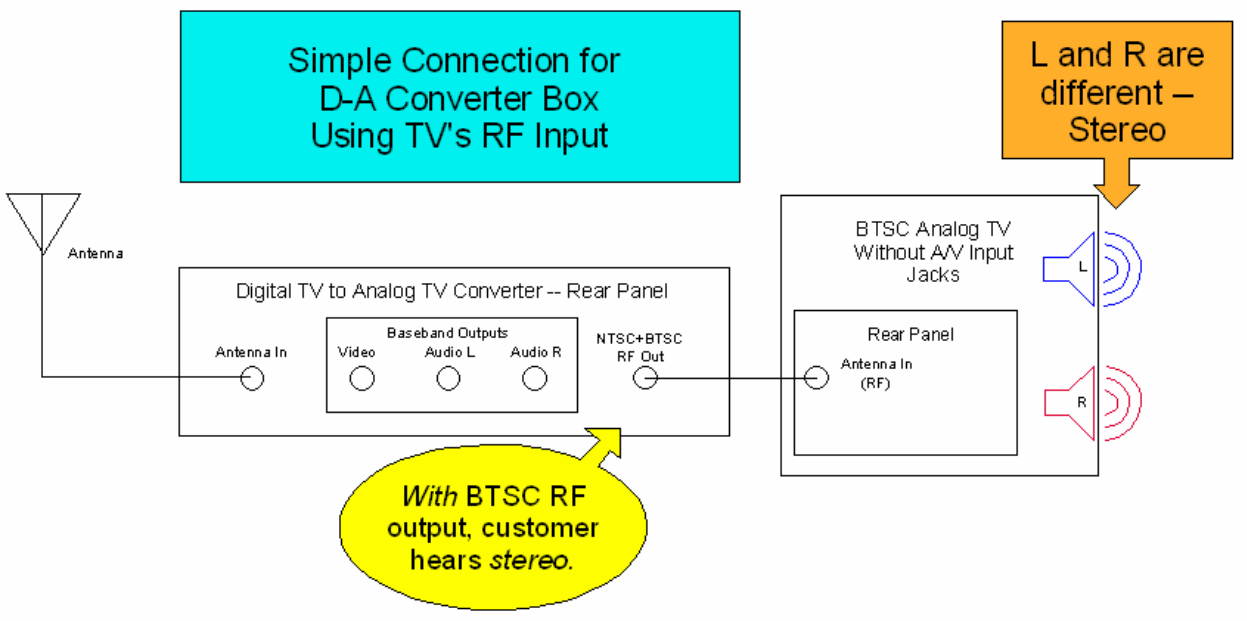


**Figure F**

THAT believes that, for the vast majority of consumers purchasing and using the converter boxes, this will be the preferred connection.

### B. The RF Output should deliver Stereo, and to do so Must Include BTSC Stereo Audio

THAT believes it is NTIA's intention that the converter box deliver stereo audio to listener/viewers. Such intention would be consistent with the Notice's language relating to minimum performance standards and the intent of the original legislation. However, given expectations as to the connections which will be commonly be used in order to consistently deliver stereo audio to current analog TV sets, it is essential that stereo audio information be present not only at the baseband composite video and left/right audio jacks, but also at the **RF Output**. The RF output will contain stereo (left/right) audio information if, and *only* if, the output contains BTSC stereo audio information.

Unfortunately, the Notice is ambiguous with regard to whether the RF output must contain BTSC stereo information. Subparagraph II.E.(c) refers to "NTSC" in describing the RF

output. The Notice goes on to mention "NTSC" many times, but fails to mention "BTSC" at any point. It is at best unclear as to whether "NTSC" by itself or in context of a channel 3/4 RF output implies the presence of stereo (BTSC) information on the RF signal.

### C. BTSC provides the simplest and most desirable hookup for consumers to receive Stereo Audio with the Converter Box

Since 1983, when the FCC authorized BTSC broadcasts, the BTSC system has become widespread. Early BTSC TV sets were predominately made with RF inputs for connection to an antenna. More recently produced sets may also include separate analog video and L/R analog audio inputs to allow connection in more elaborate systems, especially including those used with cable and/or satellite reception. Nonetheless, today's less expensive sets may incorporate BTSC decoding to receive stereo, but lack analog video and L/R analog inputs. As a result of this history, many TV sets in the field lack analog video and/or audio inputs that would allow them to hook up to such outputs, as proposed to be provided on the proposed analog-to-digital converter boxes. Any BTSC TV sets which lack these additional inputs can *only* receive stereo audio if the signal is presented to it in BTSC RF format.

Today, the viewers targeted by the Notice connect an antenna directly to the television set. The antenna picks up analog broadcasts containing NTSC video and BTSC audio, which the TV set receives via its RF (antenna) input. The viewer/listener obtains a good, color picture, along with stereo sound and second audio program without requiring any additional equipment. The simplest way to provide a similar viewing/listening experience after the termination of analog broadcasting is to connect the converter box between the antenna output and the TV set's RF (antenna) input, as shown in Figure F. But, this simple and desirable connection will only preserve the current stereo listening experience if the converter's RF output is equipped with BTSC audio.

If BTSC audio is not present, there may be possible workarounds that consumers could use to receive stereo audio. However, these workarounds are cumbersome and experience demonstrates they are not likely to be utilized. Specifically, in order to replicate the sound quality in present analog reception, the consumer would need to provide separate video and L/R stereo audio wires from the converter box to the TV, as shown in Figure B. Past experience demonstrates that consumers are not likely to utilize such wires. Moreover, a significant number of televisions do not include the appropriate jacks to facilitate use of these wires. For such televisions, the only alternative would be for the consumer to hook up additional equipment, such as a stereo amplifier and speakers, as shown in Figure D. This constitutes a significant additional expense and trouble to the consumer.

The intent of the Congress and the NTIA is clearly to simplify and ease the transition from current analog television to the new digital broadcast system. If following the shut-off of analog broadcasts, consumers are unable to maintain the experience they enjoyed pre-shut-off, consumers will be more likely express concern about the shutoff and the transition. Consumers will naturally tend to adopt the simplest hookup possible when adding new equipment such as the proposed digital-to-analog converter box. If the simple one-wire hookup for the converter's output does not contain stereo information, customers choosing this hookup will not hear stereo, thus increasing the likelihood that customers will receive television service inferior to what they have been accustomed to.

If the NTIA ensures that stereo audio is presented in the RF output of the converter box, it will increase the likelihood that consumers using the converter boxes will perceive the same level of experience after the transition. This, in turn, will increase consumer satisfaction with the changeover.

**D. <u>To ensure that Stereo Audio is presented within the RF output of the Converter Box, small changes in the language of the Notice are required</u>**

In order to ensure that converter boxes are able to consistently provide stereo audio, THAT recommends that the following changes (indicated in **bold)** be made on page 12 of the Notice:

> (a) appropriately processes all ATSC radio frequency (RF) signals provided to the antenna-only input and then provides output signals in standard definition video for display on an NTSC**/BTSC** television receiver/monitor;
>
> (b) delivers NTSC composite video and stereo audio to drive NTSC monitors;
>
> (c) delivers Channel 3 or 4 switchable (NTSC **video with BTSC stereo audio**) RF output for television receivers;
>
> (d) complies with FCC requirements for Closed Captioned, Emergency Alert System (EAS) and the required parental controls;
>
> (e) operable by and includes a remote control; and
>
> (f) tunes to all television channels 2-69.
>
> NTIA proposes to accept certification for converter boxes that are capable of only receiving over-the-air broadcast signals for display over analog-only (NTSC**/BTSC**) receivers/monitors to firmly control the nature of the input and output signals and connectors on the box. The only input of the converter box shall be for an external antenna. The outputs shall be channel 3 or 4 (NTSC **video with BTSC stereo audio** modulated signals), composite video (NTSC baseband), and audio (stereo). The single input (Type F connector) ensures that only an antenna can be connected to eligible boxes thus ensuring use of such boxes as for over-the-air television reception only. The channel 3 or 4 analog output (Type F connector) ensures that older style NTSC/**BTSC** analog television receivers can be connected to eligible boxes. The composite video and stereo audio (all three RCA connectors) ensures that other NTSC analog television monitors can also connect to the boxes. We seek comment on these characteristics that we propose to use to certify converter boxes and on other characteristics we should consider as well.
>
> NTIA proposes to require manufacturers to self-certify that the converter boxes meet the standards outlined in the rules. NTIA reserves the right to test the converter boxes that have been self-certified by the manufacturer to ensure that they meet those standards. We also invite comment on whether there are existing industry or government organizations engaged in activities that can help speed the

development of testing/certification processes within the allowed time frame of this program?

For purposes of this program, we interpret the Act's definition to mean that a digital-to-analog converter box is *not* a digital cable television box. Therefore, we do not propose to accept self-certifications for a digital cable television box. We also do not intend to accept certifications for converter boxes that have features beyond those necessary to convert an ATSC digital signal to an analog NTSC/**BTSC** format.

These changes will ensure that the converter box will be capable of providing stereo audio to all consumers who now enjoy stereo audio using the current analog system.

## V. CONCLUSION

Color video plus stereo audio has been an integral part of the TV experience for over twenty years. Viewers/listener have come to expect NTSC video and BTSC audio as the minimum quality level for their televisions. THAT Corporation urges NTIA to preserve this experience when it implements its coupon program for Digital-to-Analog converter boxes.

Respectfully submitted,

/s/

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September 25, 2006

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