TECHNICAL STATEMENT
IN RESPONSE TO A PETITION FOR RECONSIDERATION
LOJACK STOLEN VEHICLE RECOVERY SYSTEM

Technical Statement

The engineering consulting firm of du Treil, Lundin & Rackley, Inc. has been retained by the LoJack Corporation to respond to the Petition for Reconsideration filed by Hammett & Edison, Inc., Consulting Engineers in the matter of LoJack's Stolen Vehicle Recovery System (SVRS) operating on 173.075 MHz.[1] The LoJack system transmits on a frequency located adjacent to the television Channel 7 spectrum (174–180 MHz) in the VHF band. The purpose of this statement is to confirm the validity of the FCC's interference analysis of the LoJack SVRS system with respect to adjacent Channel 7 television facilities.

At paragraph 18 of the *FCC Declaratory Ruling and Order*[2] the FCC discussed its conclusion that there is no compelling need to wait for the result of additional DTV testing to evaluate the interference effects on DTV receivers tuned to Channel 7 and operating in the presence of the adjacent LoJack transmission. The FCC properly concluded that there was sufficient additional margin, compared to the former analog receivers, to interference with respect to the SVRS system. Specifically, the FCC stated that "[w]hen we calculate the difference between these figures, we find that existing DTV receivers have about 19 dB better interference rejection performance than analog receivers, which compensates for a 17 dB loss in desired signal at the service area edge."[3] This conclusion was based on a desired-to-undesired lower-adjacent DTV-to-DTV interference ratio of -33 dB, which was based

[1] *Request by LoJack Corporation for a Partial Waiver of Section 90.20(e)(6) and Part 2 of the Commission's Rules*, Petition for Reconsideration of Hammett & Edison, Inc., Consulting Engineers, WT Docket No. 06-142 (filed Oct. 3, 2011) ("Petition").
[2] *Request by LoJack Corporation for a Partial Waiver of Section 90.20(e)(6) and Part 2 of the Commission's Rules*, Declaratory Ruling and Order, WT Docket No. 06-142 (Sept. 14, 2011) ("Order")
[3] *Ibid.*

on the Office of Engineering and Technology (OET) report on tests of 2005 and 2006 consumer DTV receivers.[4]

The H&E Petition questions the FCC's conclusion and states that the desired-to-undesired lower-adjacent DTV-to-DTV interference ratio of -33 dB should not have been employed in the FCC's LoJack analysis. This was claimed because the -33 dB interference ratio is based upon a wide-band interferer signal (such as DTV) and not a narrow-band interferer such as LoJack.

However, the FCC is correct in its conclusion that DTV receivers have better interference rejection characteristics to a narrowband LoJack-type of emission than analog television receivers. The FCC calculated that existing DTV receivers have a +19 dB better interference rejection than analog receivers. As the FCC recognized, narrowband transmissions, such as LoJack, operating near the DTV channel band edge have less of an impact to DTV receivers than an adjacent wide-band DTV channel. In fact, testing of the interference of narrowband emissions in regard to adjacent DTV signals were completed by the Advanced Television Test Committee (ATTC) in support of the current ATSC DTV transmission standard.[5] These data were accepted by the FCC within the LoJack proceedings as well as the proceedings establishing the DTV service.[6] The relevant excerpt of the ATTC report regarding narrowband emissions testing are provided herein as an Appendix.

In the referenced ATTC narrowband test, a discrete undesired carrier, such as would closely characterize the LoJack signal transmissions, was injected into the received DTV signal over a series of frequencies ranging from several MHz below the desired DTV channel band to several MHz above the desired DTV channel band. The testing was completed in the VHF band with a 'weak' desired DTV signal strength assumption. At the frequency centered approximately 1 MHz below the desired DTV lower band edge channel, the test determined that the desired-to-

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[4] *Interference Rejection Thresholds of Consumer Digital Television Receivers Available in 2005 and 2006*, OET Report FCC/OET 07-TR-1003, Technical Research Branch, Laboratory Division, Office of Engineering and Technology, Federal Communications Commission (Mar. 30, 2007).
[5] *Digital HDTV Grand Alliance System Record of Test Results*, October, 1995.
[6] *Amendment of Section 90.20(e)(6) of the Commission's Rules*, Report and Order, 23 FCC Rcd. at ¶14 (2008); *In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Forth Report and Order in MM Docket 07-268, Federal Communications Commission (December 24, 1996).

undesired ratio would be -47.44 dB.[7] This desired-to-undesired ratio is more than 14 dB better than the -33 dB ratio conservatively assumed in the FCC analysis.

This ATTC test is almost directly "on-point" to a LoJack type of interference situation and hence clearly supplants the data and analysis supplied within the Hammett & Edison Petition.

Therefore, based upon the existing ATTC laboratory test data for narrowband emissions, DTV receivers exceed the +19 dB better interference rejection performance calculated by the Commission and in fact have at least a +33 dB better interference rejection performance than analog receivers. This confirms that the FCC conclusion is correct in its analysis that DTV receivers are indeed more tolerant to LoJack transmissions than the former NTSC analog receivers.

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[7] This is the desired-to-undesired signal ratio that is necessary before a threshold of visibility (ToV) impairment occurred to the desired DTV signal.

APPENDIX

DTV VHF IMPACT FROM ADJACENT NARROWBAND UNDESIRED EMITTER EXCERPT FROM THE ATTC TESTS OF THE GRAND ALLIANCE DTV SYSTEM

digital HDTV
Grand Alliance System

from

AT&T
David Sarnoff Research Center
General Instrument Corporation
Massachusetts Institute of Technology
North American Philips Corporation
Thomson Consumer Electronics
Zenith Electronics Corporation

Record of Test Results

Submitted to

Advisory Committee on Advanced Television Service
of the
Federal Communications Commission

by

Advanced Television Test Center, Inc.

Cable Television Laboratories, Inc.

Advanced Television Evaluation Laboratory
Communications Research Centre, Industry Canada

Systems Subcommittee/Working Party 2 (ACATS)
Task Forces on Digital-Specific Tests, Audio & Field Tests

Association for Maximum Service Television

Public Broadcasting Service

Hitachi America, Ltd.

IBM

October 1995

3.7.6. Discrete Frequency Interference

The susceptibility of the Grand Alliance system to interference from discrete carrier frequencies was tested in accordance with the Test Plan, Section I-3.7.3.4. The 25 frequencies tested cover the range from approximately 3 MHz below the desired Channel 12 to approximately 3 MHz above the desired channel and are listed in Table 3-14, with the TOV found for each frequency. The thresholds are plotted versus the undesired carrier frequency in Figure 3-2.

Table 3-14

Discrete Frequency Interference into ATV

ATTC Test #	Frequency (MHz)	Desired Power		Desired to Undesired Ratio (dB) BER Method	
		Level	dBm	ACQ	TOV
102	201.0125	W	-67.82	OK	-52.02
103	201.5125	W	-67.80	OK	-51.59
104	202.0125	W	-67.79	OK	-50.34
105	202.5125	W	-67.79	OK	-49.89
106	203.0125	W	-67.78	OK	-47.44
107	203.5125	W	-67.78	OK	-45.09
108	204.0125	W	-68.02	OK	-20.05
109	204.5125	W	-67.78	OK	10.70
110	205.0125	W	-67.78	OK	10.30
111	205.5125	W	-67.78	OK	10.61
112	206.0125	W	-67.78	OK	10.16
113	206.5125	W	-67.78	OK	11.73
114	207.0125	W	-67.78	OK	13.11
115	207.5125	W	-68.02	OK	10.76
116	208.0125	W	-67.78	OK	9.52
117	208.5125	W	-67.78	OK	9.08
118	209.0125	W	-68.02	OK	9.06
119	209.5125	W	-67.78	OK	10.03
120	210.0125	W	-67.80	OK	-16.46
121	210.5125	W	-67.79	OK	-47.42
122	211.0125	W	-67.78	OK	-48.16
123	211.5125	W	-67.79	OK	-50.86
232	212.0125	W	-67.79	OK	-50.33
233	212.5125	W	-67.79	OK	-51.08
234	213.0125	W	-67.79	OK	-51.32

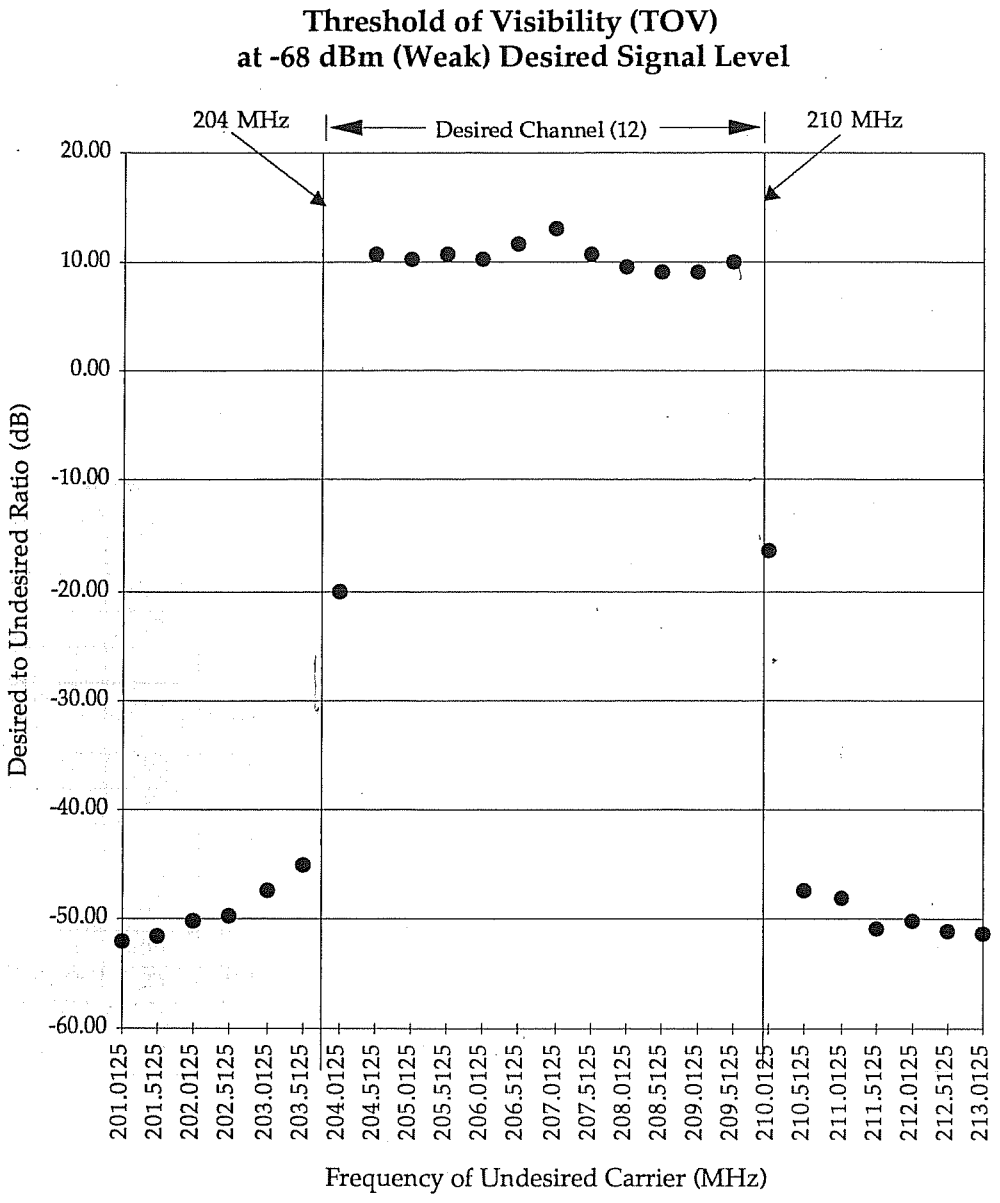
Threshold of Visibility (TOV)
at -68 dBm (Weak) Desired Signal Level
204 MHz
Desired Channel (12)
210 MHz
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
Desired to Undesired Ratio (dB)
201.0125
201.5125
202.0125
202.5125
203.0125
203.5125
204.0125
204.5125
205.0125
205.5125
206.0125
206.5125
207.0125
207.5125
208.0125
208.5125
209.0125
209.5125
210.0125
210.5125
211.0125
211.5125
212.0125
212.5125
213.0125
Frequency of Undesired Carrier (MHz)

Figure 3-2