NATIONAL RADIO SYSTEMS COMMITTEE

67 kHz-Compatible High-speed Data System Laboratory Test Report November 12, 1997



REPORT

NAB: 1771 N Street, N.W. Washington, DC 20036 Tel: (202) 429-5356 Fax: (202) 775-4981



CEA: 1919 South Eads Street Arlington, VA 22202 Tel: (703) 907-7660 Fax: (703) 907-8113

Co-sponsored by the Consumer Electronics Association and the National Association of Broadcasters http://www.nrscstandards.org

NRSC-R35

NOTICE

NRSC Standards, Guidelines, Reports and other technical publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such Standards, Guidelines, Reports and other technical publications shall not in any respect preclude any member or nonmember of the Consumer Electronics Association (CEA) or the National Association of Broadcasters (NAB) from manufacturing or selling products not conforming to such Standards, Guidelines, Reports and other technical publications, nor shall the existence of such Standards, Guidelines, Reports and other technical publications preclude their voluntary use by those other than CEA or NAB members, whether to be used either domestically or internationally.

Standards, Guidelines, Reports and other technical publications are adopted by the NRSC in accordance with the NRSC patent policy. By such action, CEA and NAB do not assume any liability to any patent owner, nor do they assume any obligation whatever to parties adopting the Standard, Guideline, Report or other technical publication.

This Guideline does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of this Guideline to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before its use.

Published by CONSUMER ELECTRONICS ASSOCIATION Technology & Standards Department 1919 S. Eads St. Arlington, VA 22202

NATIONAL ASSOCIATION OF BROADCASTERS Science and Technology Department 1771 N Street, NW Washington, DC 20036

©2008 CEA & NAB. All rights reserved.

This document is available free of charge via the NRSC website at <u>www.nrscstandards.org</u>. Republication or further distribution of this document, in whole or in part, requires prior permission of CEA or NAB.

NRSC-R35

FOREWORD

NRSC-R35, 67 kHz-Compatible High-speed Data System Laboratory Test Report, is the third of three test reports submitted to the NRSC's High-Speed FM Subcarrier (HSSC) Subcommittee. Three digital FM subcarrier systems were evaluated during these tests—DARC (submitted by Digital DJ, Inc.), STIC (submitted by Mitre Corporation), and HSDS (submitted by Seiko, Inc.). The co-chairmen of the HSSC Subcommittee at the time of the submission of NRSC-R35 were Michael Rau and David Kelly. The NRSC Chairman at the time of the submission of NRSC-R35 was Charles Morgan.

The NRSC is jointly sponsored by the Consumer Electronics Association and the National Association of Broadcasters. It serves as an industry-wide standards-setting body for technical aspects of terrestrial over-the-air radio broadcasting systems in the United States.

NATIONAL RADIO SYSTEMS COMMITTEE



2500 Wilson Boulevard Arlington, VA 22201 (703) 907-7500 FAX (703) 907-7501



1771 N Street, NW Washington, DC 20036 (202) 429-5346 FAX (202) 775-4981

anna gur . Anna anna a

High-speed FM Subcarrier Subcommittee

And Construction and all should be an a construction of the

where the second s

67 kHz-Compatible High-speed Data System Laboratory Test Report

November 12, 1997

and the second second

1944 (1944) 1944 - Maria Maria (1944)

Thomas B. Keller, Consultant David M. Londa, RF Test Manager

Sponsored by the Electronic Industries Association and the National Association of Broadcasters

(Attachment 2)

November 12, 1997

TABLE OF CONTENTS (Revised 11/19/97)

- 1. Introduction
- 2. Test Procedure
- 3. Test Data
- 4. Injection Level Calibration and Analog Subcarrier Deviation Plots
- 5. 67 kHz Subcarrier Receiver Characteristics at Moderate Signal Level (-65 dBm)
- 6. Proponent-only RF, Baseband, and Analog Proof Plots (Seiko)
- 7. SCA Group C RF, Baseband, and Analog Proof Plots (Seiko)
- 8. SCA Group D RF, Baseband, and Analog Proof Plots (Seiko)
- 9. Proponent-only RF, Baseband, and Analog Proof Plots (Mitre)
- 10. SCA Group C RF, Baseband, and Analog Proof Plots (Mitre)
- 11. SCA Group D RF, Baseband, and Analog Proof Plots (Mitre)

Appendices:

- Appendix A Test B-3 Data with Simulator Offsets
- Appendix B RF Distortion Scenario Frequency Response
- Appendix C Proponent Receiver Characterization Data

TABLE OF CONTENTS

1201 130

1. Introduction

2. Test Procedure

3. Test Data

4. Injection Level Calibration and Analog Subcarrier Deviation Plots

5. 67 kHz Subcarrier Receiver Characteristics at Moderate Signal Level (-65 dBm)

6. Proponent-only RF, Baseband, and Analog Proof Plots (Seiko)

7. SCA Group C RF, Baseband, and Analog Proof Plots (Seiko)

8. SCA Group D RF, Baseband, and Analog Proof Plots (Seiko)

9. Proponent-only RF, Baseband, and Analog Proof Plots (Mitre)

10. SCA Group C RF, Baseband, and Analog Proof Plots (Mitre)

11. SCA Group D RF, Baseband, and Analog Proof Plots (Mitre)

Appendices:

Appendix A Test B-3 Data with Simulator Offsets

Appendix B RF Distortion Scenario Frequency Response

6 ..

Digital Radio Test Laboratory

List of Figures

Ĵ

Figure 1: RF Carrier Wave & 2nd Bessel Null 67

Figure 2: 85.5 kHz Subcarrier at 10 % Injection 87

Figure 3: Sine 10% Injection 00,09 (repeated)

Figure 4: Seiko at 10 % Injection 88

Figure 5: Mitre at 10 % Injection 89

Figure 6: 67 kHz Subcarrier CW and with 5.5 kHz Deviation 1 kHz Sine. 90

Figure 7: Desired 67 and 92 kHz Subcarriers CW and with 5.5 kHz Deviation 1 kHz Sine. 9

Figure 8: Undesired 67 and 92 kHz Subcarriers CW and with 5.5 kHz Deviation 1 kHz Sine. 9

97,98 (repeated)

Figure 9: Noise Floor with and without RBDS at 3% 93

Figure 10: Audio with and without RBDS at 3% 93

Figure 11: Audio with and without Seiko at 10% 94

Figure 12: Audio with and without Mitre at 10% 95

Figure 13: Frequency Response 9ψ

Figure 14: Distortion + Noise 96

Figure 15: Distortion + Noise with RBDS at 3%

Figure 16: Distortion + Noise with Seiko at 10% 97

Figure 17: Distortion + Noise with Mitre at 10% 98

Figure 18: Seiko RF 100

Figure 19: Seiko AFM2 Baseband 100

Figure 20: Seiko Frequency Response (0)

Figure 21: Seiko Distortion + Noise $l \circ l$

Figure 22: Seiko Separation 102

Figure 23: Seiko RF Group C 104-

Figure 24: Seiko AFM2 Baseband Group C 10 4

Figure 25: Seiko Group C Frequency Response 105

Figure 26: Seiko Group C Distortion + Noise 105

Figure 27: Seiko Group C Separation / 06 File Name: LISTS.XLS List of Figures

Digital Radio Test Laboratory

Figure 28: Seiko RF Group D 108 108 Figure 29: Seiko AFM2 Baseband Group D Figure 30: Seiko Group D Frequency Response 109 Figure 3': Seiko Group D Seiko Distortion + Noise 109 Figure 32: Seiko Group D Seiko Separation 110 Figure 33: Mitre RF 112 $\mathcal{A}_{\mathcal{A}}$ <u>.</u> Figure 34: Mitre AFM2 Baseband 112 Figure 35: Mitre Frequency Response 113 ALC: NOT STATE Figure 36: Mitre Distortion + Noise 113 114 Figure 37: Mitre Separation Figure 38: Mitre RF Group C 116 116 Figure 39: Mitre AFM2 Baseband Group C Figure 40: Mitre Group C Frequency Response רוו 117 Figure 41: Mitre Group C Distortion + Noise Figure 42: Mitre Group C Separation 118 a ta a **katu di a ma**ni ja a Figure 43: Mitre RF Group D 120 120 Figure 44: Mitre AFM2 Baseband Group D 121 Figure 45: Mitre Group D Frequency Response 121 Figure 46: Mitre Group D Distortion + Noise e hate to ha had Figure 47: Mitre Group D Separation 122 $r \neq s$ 。 29月1日,这些公司。 ia £1

File Name: LISTS.XLS

ł

and the second second

4

٢.

1.0 Introduction

. i

,

.

5

2.0 Test Procedure

6

G .

8.55

1

NATIONAL RADIO SYSTEMS COMMITTEE



12

2500 Wilson Boulevard Arlington, VA 22201 (703) 907-7500 FAX (703) 907-7501

Calle Ren view party

课行过去 法正任 操 编辑 虚

an sherin bahasi ngan katala katala Manakasi Katalakasi na manakasi na katalaka k

A A Constanting of the Constant of the Constan

the states of the second

- â

<u>.</u>

二十 約約 计内心

對臺灣 建构成分子 建磷酸物的 化自己输出合金 计分子的

1.14.4



1771 N Street, NW Washington, DC 20036 (202) 429-5346 FAX (202) 775-4981

- M

ang katalan kara di kara

High-speed FM Subcarrier Subcommittee

67 kHz-Compatible High-speed Data System Laboratory Test Procedure

(As adopted by the Subcommittee on June 25, 1997)

67 kHz COMPATIBLE HIGH SPEED DATA LABORATORY TESTS TEST OUTLINE

- Tests with strikethrough were performed during the initial round of laboratory tests but will be skipped for 67 kHz compatible system tests; tests that are <u>underlined</u> are new for the 67 kHz compatible system tests.
- Acronyms used in test procedure: MER - Message error rate POF - Point of failure
- A. Calibration
 - 1. Check signal injection/power (daily)
 - 2. Plot RF spectrum (daily)
 - 3. Noise check (daily)
 - 4. Weak signal check (daily)
 - 5. Analog channel proof (bi-weekly)
 - 6. Calibrate modulation monitors (monthly)
 - 7. Proponent self-check (optional)
 - 8. Calibrate test bed (monthly)
- B. Characterization of signal failure
 - 1. Noise
 - 2.---Co-channel
 - 3. Multipath and noise
 - 4. Impulse noise
 - 5. Airplane flutter
 - 6. Weak signal failure
- C. Reacquisition
 - 1. Failure due to simulated weak signal
 - 2.—Failure due to multipath
 - 3. Acquisition time
- D. Digital subcarrier -> host analog
 - 1. Interference to host analog
 - 2. Interference to host analog with multipath
 - 3. Interference to host analog with distortion in RF path
- E. Host analog -> digital subcarrier
 - 1. Host analog to digital subcarriers
 - 2. Host analog to digital subcarriers with multipath
 - 3. Host analog to HSSC with distortion in RF path

- F. HSSC -> RDS, analog, and 57 kHz paging subcarriers
 - 1. HSSC to 67 kHz analog subcarriers
 - 2. HSSC to RDS

BLER - Block error rate (only used with RDS)

OAME - Onset of additional message errors

- 3.-- HSSC to 57 kHz paging
- G. Adjacent channel

OME - Onset of message errors

- 1. First adjacent
- 2. Second adjacent
- H. System specific
 - 1. Phase, digital to 19 kHz pilot
 - 2. Nonstandard injection levels
 - 3.---Variable injection
- I. Proponent receiver characterization
- J. Additional information
 - 1. Subcarrier groups
 - 2. Test signal levels
 - 3. Onset of message error (OME) definition
 - 4. Onset of additional message errors (OAME) definition
 - 5. Point of failure (POF) definition

Page 2

....

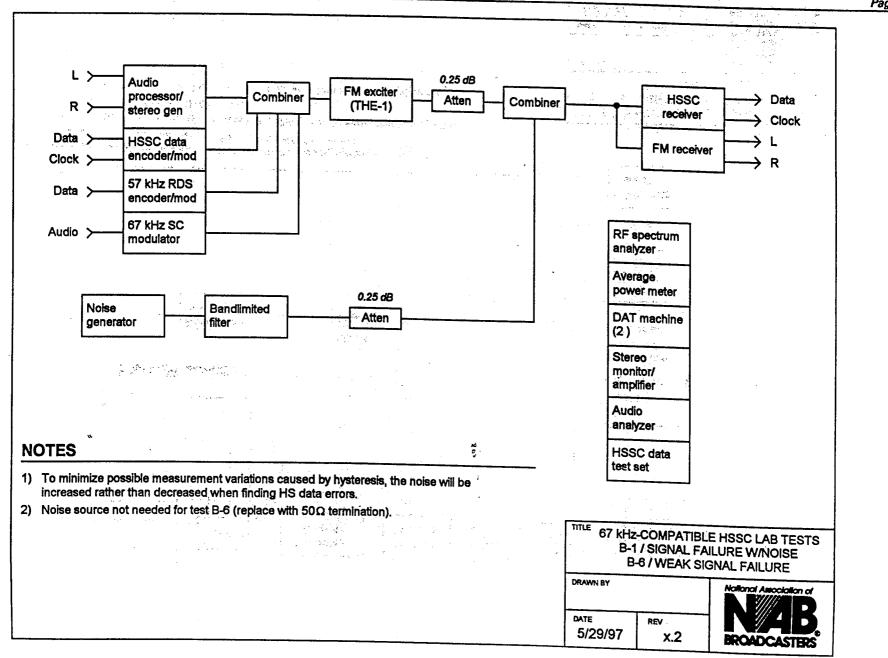
•_

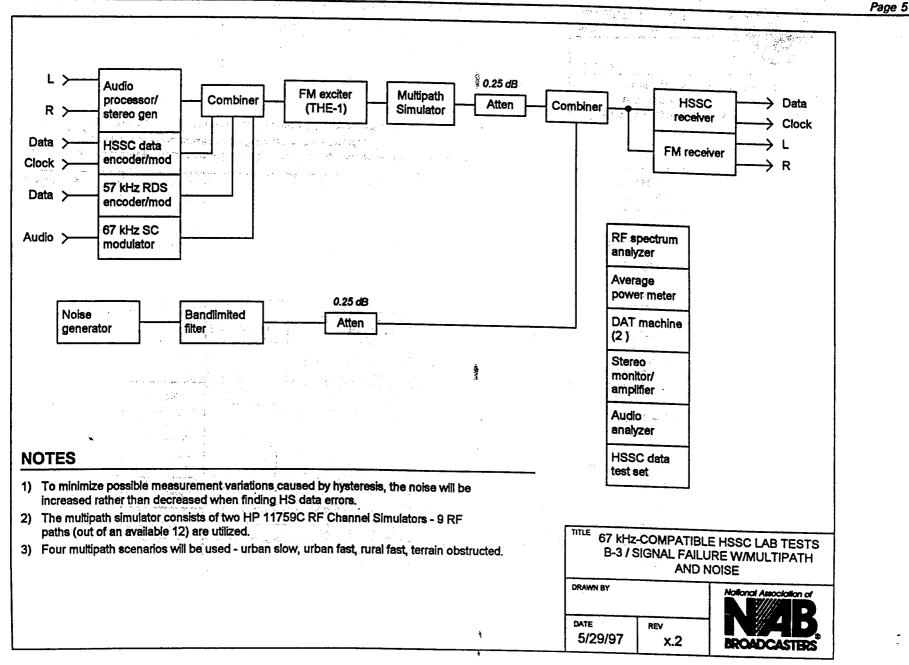
	Test &	67 kHz COMPATIBLE HIGH SPEED DA		TURY TES	IS		
Test Group	Impairment	TEST PROCEDURE	Type of Eval	Sig Lev	System: Seiko	System: MITRE	Test results Data to be
A Calibration	1. HSSC subcarrier injection (daily)	The injection will be determined by percentage of modulation and peak deviation.	Objective	As needed	X 10%	X 10%	recorded Injection
	2. Spectrum (daily) 3. Noise	An RF plot of each system will be taken daily. <u>Baseband spectrum analyzer settings</u> : Span 100 kHz, res. BW 300 Hz, video BW 30 Hz, sweep time 30 sec. <u>RF spectrum analyzer settings</u> : Span 200 kHz or 500 kHz, res. BW 1000 Hz, video BW 30 Hz, sweep time auto. Subcarrier groups C or D will be used for this test.	Objective	M (-65 dBm)	X 10%	X 10%	Spectrum plots (FM baseband and modulated FM carrier)
	(daily)	Gaussian noise will be added to the signal in 0.25 dB steps until the onset of message errors (OME) is observed. Subcarrier groups C and D will be used for this test.	Objective	M (-65 dBm)	X 10%	X 10%	Co/No, MER at the OME
	4. Weak signal (daily)	Starting with a medium signal level, the signal will be reduced until the OME is observed. Subcarrier group C will be used for this test.	Objective	M (-65 dBm)	X 10%	X	Signal level, MER
	5. Proof host transmitters (bi-weekly)	An automated proof of performance will be conducted on the analog transmitters. The test will include the analog system performance with and without subcarrier group C. A high quality demodulator will be used for the test.	Objective	M (-65 dBm)	NA NA	10% NA	at the OME Record of frequency respon: , separation, and
	6. Monitor calibration (monthly)	The FM analog modulation monitors will be calibrated monthly.	Objective	NA	NA	NA	distortion Calibration record in
	7. Proponent self check (optional)	This test will use the proponent self-certification routine to determine if the system is operating within specified limits.	Objective	System need	x	x	lab log Note in lab log
	8. Test bed calibration (monthly)	All of the critical components in the test bed including the multipath simulator, attenuators, combiners, filters, generators, and measuring instruments will be calibrated on a monthly schedule.	Objective	NA	NA	NA	Calibration record in lab log

Page 3

	Test &		Type of	T	Custom		·······
Test Group	Impairment	TEST PROCEDURE	Eval	Sig Lev	System: Seiko	System: MITRE	Test results Data to be recorded
B Character- ization of HS digital subcarrier signal failure	1. Noise	 Using clipped pink noise for main channel modulation and subcarrier groups C and D, Gaussian noise will be added to the signal and increased to a level that produces the OME and POF, and HSSC MER will be recorded. The 67 kHz analog subcarrier channel audio S/N will be measured with no noise added to the RF channel and with the noise added that produced the OME and POF recorded in step 1. HSSC MER will be plotted versus Co/No from OME to POF. 	Objective	M (-65 dBm)	X 10%	X 10%	Co/No, MER at the OME and POF 67 kHz subcarrier analog S/N at the OME and POF
	3. Multipath and noise	 This test will be conducted four times, each with a different multipath scenario. The scenarios will be those used by the EIA DAR Subcommittee for testing DAR systems, and are urban slow, urban fast, rural fast, and terrain obstructed. Using subcarrier group C and without added noise, MER performance of each systems will be assessed for each multipath scenario. If the MER is non-zero, MER will be recorded. Then, Gaussian noise will be added to the signal until the OAME is observed. The noise will be increased in four 1 dB steps, and the MER will be recorded at each point. If the MER is zero (with no added noise), then noise will be added to the signal (in 0.5 dB steps) until the OME. Data will be taken at OME and with the noise increased in four 1 dB steps 	Objective	M (-65 dBm)	X 10%	X 10%	MER (no noise); Co/No, MER, for OAME or Co/No, MER with added noise (OME and OAME)
	6. Weak signal	 Starting with the medium signal level (-65 dBm), the signal level will be reduced (in 0.25 dB steps) until the OME and POF are observed. Subcarrier groups C, D, and no subcarriers, will be used for this test 	Objective	Varying	X 10 %	X 10 %	Signal level MER at OME and POF







12

Test Group

Reacqui-

sition

С

Test &

3

Impairment

1. Simulated signal failure

and a second acquisition

.

۰.

142.11

.

÷

	3				Page 6
67 kHz COMPATIBLE HIGH SPEED DA	TA LABORA	TORY TES	TS		
TEST PROCEDURE	Type of Eval	Sig Lev	System: Seiko	System: MITRE	Test results Data to be
 Continuous music will be used for the FM audio modulation, and subcarrier group C will be used. The HSSC signal will be connected to the HSSC receiver and acquisition time recorded. 	EO&C in lab	M (-65 dBm)	X 10%	X 10%	recorded Acquisition time
3. EO&C comments will be recorded by the laboratory specialists.	and the second		an arts		

arain Stroge

÷ 经济费 网络小人

i de la compositione

a' the fage

٩,

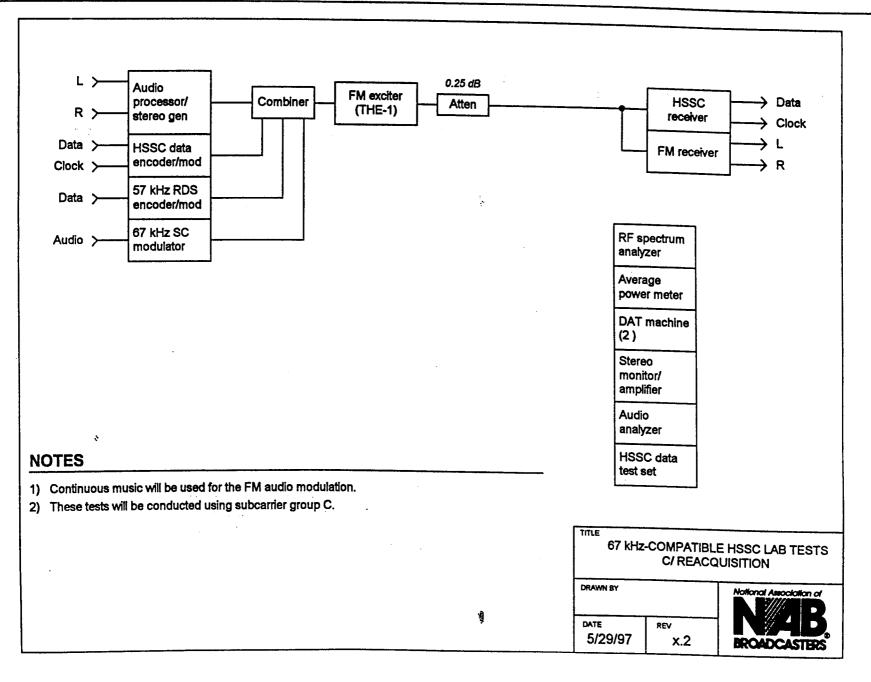
1

1

2000

Page 7

: A



Rev. 1.0

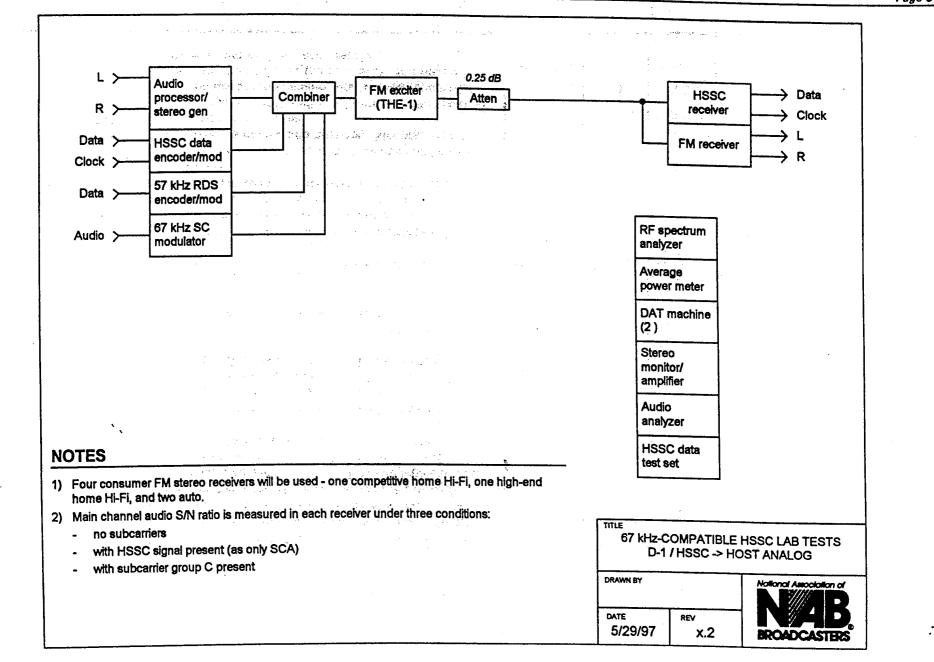
فيستحد الاركار بارتمين فالالا

Page 8

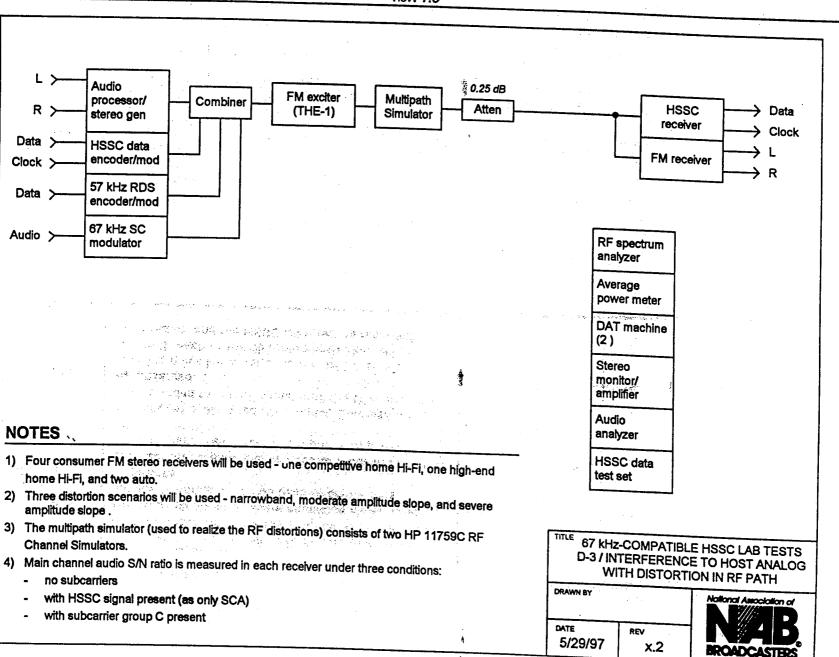
	Test &	67 kHz COMPATIBLE HIGH SPEED DA	the second data and the second	1				
Test Group	Impairment	TEST PROCEDURE	Type of Eval	Sig Lev	System: Seiko	System: MITRE	a anglas an anglas sa s	Test results Data to be
D HSSC subcarrier -> host analog	1. HSSC subcarrier -> host analog	 Four consumer FM stereo receivers will be used for. the tests: one competitive home hi-fi, one high-end home hi-fi, and two auto. (The performance of these receivers has been characterized by the EIA DAR Subcommittee Working Group B.) The high-end hi-fi receiver will have a built-in RDS decoder. A 67 kHz analog subcarrier receiver will be available for these tests. The main audio channel S/N will be measured with no subcarriers, for each receiver. The main audio channel S/N will then be measured with the HSSC (as the only SCA) turned on, for each receiver. The main audio channel S/N will then be measured with the HSSC (as the only SCA) turned on, for each receiver. 	Objective	M (-65 dBm) & W (-75 dBm)	10%	X 10%	•	recorded Main channel audio S/N for each receiver: without subcarriers with HSSC (as only SCA) with subcarrier group C
	3. HSSC to host analog with distortion in RF path	 The receivers used in test D-1 will be used for this test. This test will be conducted utilizing three different RF path distortion scenarios – narrow band, moderate amplitude slope, and severe amplitude slope. The multipath simulator will be used to create these distortions. Moderate classical music and silence will be used to modulate the main audio channel. Moderate audio processing will be used. The main channel audio S/N ratio will be measured for each distortion scenario, first without subcarriers, then with the HSSC as the only SCA, and then with subcarrier group C, for each receiver. 	Objective	M (-65 dBm)	10 %	X 10 %		Main channel audio S/N for each receiver under each test condition

,

Page 9



Ē



.

.

à. . .

NG MARADANA

<u>____</u>

÷.

. .

• •

Rev. 1.0

÷8

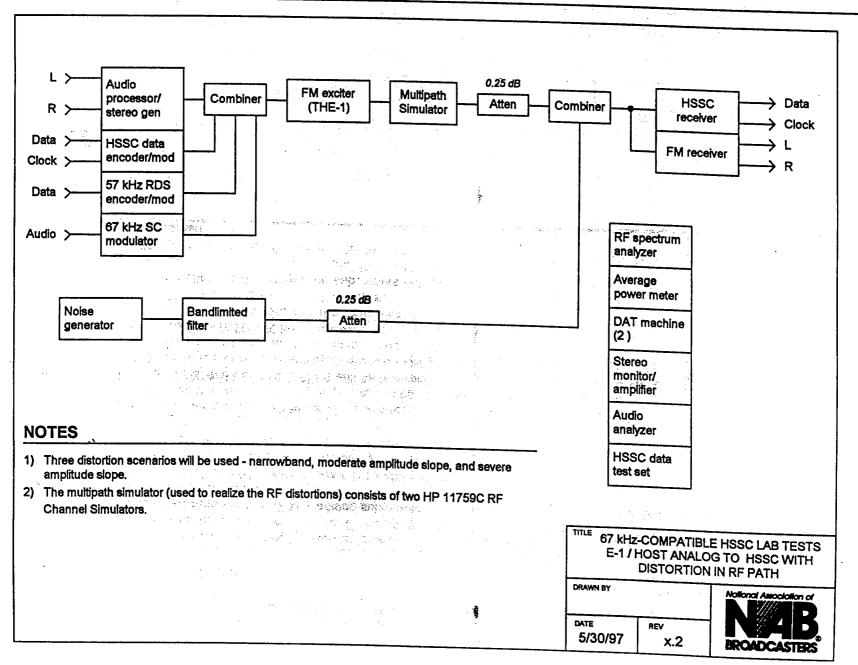
	Test &	67 kHz COMPATIBLE HIGH SPEED DA					
Test Group	Impairment		Eval	Sig Lev	System: Seiko	System: MITRE	 Test results Data to be
E Host analog -> digital subcarrier	3. Host analog to HSSC with distortion in RF path	 This test will be conducted utilizing three different RF path distortion scenarios - narrow band, moderate amplitude slope, and severe amplitude slope. The multipath simulator will be used to create these distortions. ABBA and silence will be used to modulate the main audio channel. Moderate audio processing will be used. Using an undistorted RF channel, Gaussian noise will be added to the RF signal until the OME and POF are observed. Using noise levels required for OME and POF found in step 3, each of the distortion scenarios will be switched in, and the HSSC MER will be recorded. 	Objective	M (-65 dBm)	10%	10%	recorded Co/No, MER at OME and POF (undistorte RF path) MER with distortions (at OME and POF as determined in step 3)

 $|\psi_{i}| = |\psi_{i}| < 1 \le i$

14

.

Page 12



Rev. 1.0

Page 13

٠

2.0

a a sal

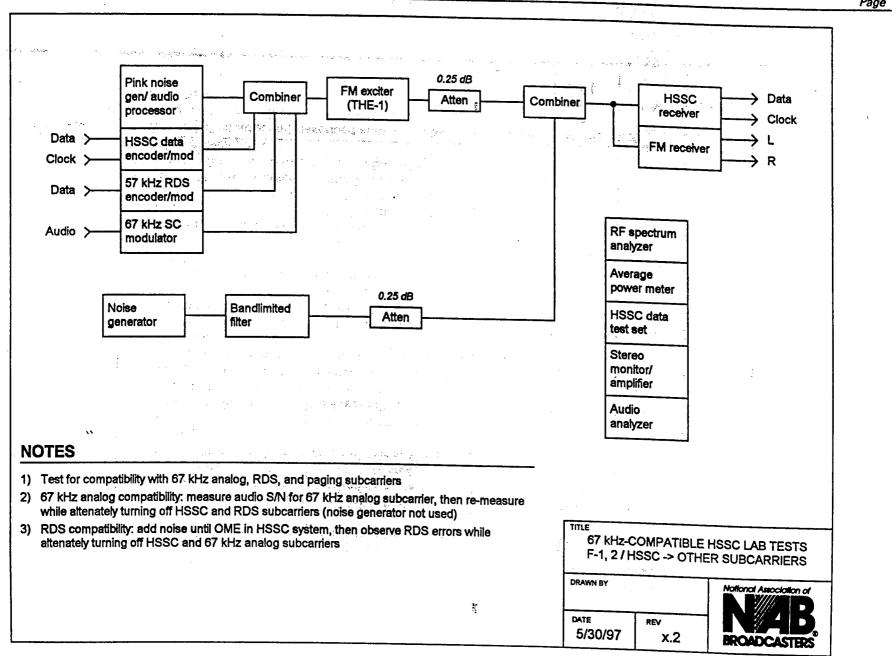
1999 - A. A. and they

Test Group	Test & Impairment	TEST PROCEDURE	Type of Eval	Sig Lev	System: Seiko	System: MITRE	Test results Data to be
F HSSC subcarrier -> RDS and 67 kHz analog subcarrier	1. HSSC -> 67 kHz analog subcarrier	 Subcarrier group C will be used for this test. With all the subcarriers in group C operating, the audio S/N ratio for the 67 kHz analog subcarrier channel will be measured. The HSSC and RDS subcarriers will be alternately turned on and off. Each time, the audio S/N ratio for the 67 kHz analog subcarrier channel will be measured. 	Objective	M (-65 dBm)	X	X 10%	Audio S/N ratio in 67 kHz analog subcarrier
	2. HSSC -> RDS subcarrier	 Subcarrier group C will be used for this test. With all the subcarriers in group C operating, and no noise, HSSC MER and RDS BLER will be recorded. The HSSC and 67 kHz analog subcarriers will be alternately turned on and off (no noise case). Each time, the RDS BLER will be recorded. Noise will then be added to the signal until the OME and POF are observed in the HSSC signal. The HSSC and 67 kHz analog subcarriers will be alternately turned on and off, at the HSSC OME and POF operating points. Each time, the RDS BLER will be recorded. 	Objective	M (-65 dBm)	X 10 %	X 10 %	Co/No, MER at OME and POF (HSSC BLER (RDS)

. السيادي والمعمع وأراد

. يوريس المحمد حالات





で

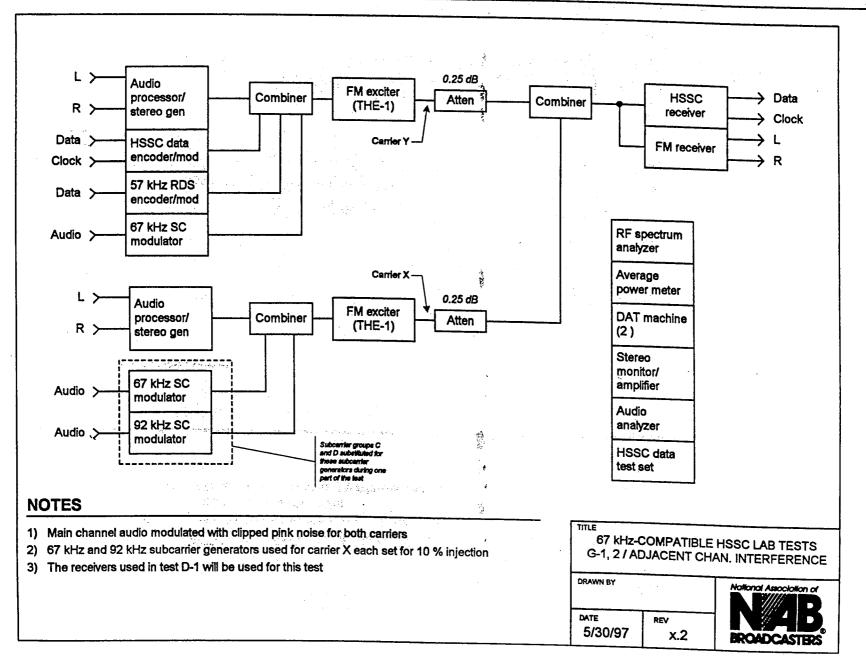
Rev. 1.0

Page 15

المحج معيمه محاديا الرارات

		67 kHz COMPATIBLE HIGH SPEED DAT	Type of		System:	System:	Test results
Fest Group	Test & Impairment	TEST PROCEDURE	Eval	Sig Lev	Seiko	MITRE	Data to be recorded
G Adjacent channel nterference	1. First adjacent	 The receivers used in test D-1 will be used for this test. Two 1st adjacent RF carriers are used, both with clipped pink noise main channel modulation. In addition, carrier X has 67 kHz and 92 kHz analog subcarriers each at 10% injection, and carrier Y has subcarrier group C. With carrier Y (desired) at moderate signal level (-65 dBm), the level of carrier X (undesired) will be increased in 0.5 dB steps until a main channel audio S/N ratio in carrier Y of 45 dB is measured. The S/N ratio of the 67 kHz subcarrier on carrier Y (desired) will also be measured. Subcarrier groups C and D will be substituted for the two analog subcarriers on carrier X (undesired). Each time, the S/N ratio in carrier Y (desired) main channel audio and 67 kHz analog subcarrier will be measured. The level of carrier X (undesired), again using the 67 kHz analog subcarriers, will be increased until the OME on the HSSC signal of carrier Y (desired). Then, carrier X will be further increased until the OAME is observed. Carrier X level will be increased in four 1 dB steps, and the MER will be 	Objective	M (-65 dBm) (de- sired)	X 10%	X 10%	D/U at mair channel audio 45 df S/N ratio (desired channel) S/N ratios in main channel audio, 67 kHz analog subcarrier of desired channel D/U, MER at OME, OAME (HSSC)
	2. Second adjacent	recorded at each point. 1. Test G-1 (first adjacent) described above, will be repeated, this time with carrier X and carrier Y 2nd adjacent to one another.	Objective	M (-65 dBm) (de- sired)	X 10 %	X 10 %	(Same as test G-1 above)

Page 16



Page 17

	Test &		HIGH SPEED DATA LABORA		System:	System:	Test results
Test Group	Impairment	TEST PROCEDURE	Eval	Sig Lev	Seiko	MITRE	Data to be
H System specific	1. Phase, HSSC to 19 kHz pilot	 1. The following tests will be conducted HSSC signal NOT locked to the stereo 1 B-1 (signal failure with noise) D-1 (HSSC -> host analog, interfe analog) 	J with the Objective	M (-65 dBm)	X		recorded (refer to tests B-1 and D-1)
					en ang salar g		I
				· .	- · ·		
					• • •		
					an a la constante de la constan En constante de la constante de		
		an a					
				•	n an		
	``						
					- 		

.2.4

;

· • .

Rev. 1.0

Page 18

		67 kHz COMPATIBLE HIGH SPEED DA					
Test Group	Test & Impairment	TEST PROCEDURE	Tupo of		System: Seiko	System: MITRE	Test results Data to be
l Proponent receiver character- ization	1. Baseband tests	 Frequency response (DC to 100 kHz) THD/frequency Limiting threshold Two-tone intermodulation First adjacent rejection Second adjacent rejection 	Objective	M (-65 dBm)	X	X	recorded (Quantities referred to under test procedure)

ें ह

a the trade a state

and the second (The second s dente de la composi-and the second and the second state of th a second a second s I second secon and the second s March March 1999 ى. بى رايانىي مەنگە مەت بايا المربيا والمراجع بالمربية أأنكم ومناجع and the second second second second · . . 1.1 Second Second Second \$ and the second 4 and a second and a second and a second and a second and a second and a second and a second and a second sec ŧ 142.12 • • * and a state of the second s an arrest in a and the second second second second

man a second provide the second second . . .

Rev. 1.0

June 25, 1997

J. Additional information

1. Subcarrier groups:

			Subcarrier Group C (RDS)			
S	ystem: Seiko	n - Materia		S	ystem: Mitre	
RDS	57.0 kHz	3 %		RDS	57.0 kHz	3 %
Data	88.5 kHz	10%		Data	88.5 kHz	10%
FM	67 kHz	7 %		FM	67 kHz	7%
			Subcarrier Group D (Paging)			
S	ystem: Seiko			S	ystem: Mitre	
Paging	57.0 kHz	10 %		Paging	57.0 kHz	10 %
Data	88.5 kHz	10 %		Data	88.5 kHz	10 9

2. Test signal levels:

WWeak-75 dBmMModerate-65 dBmSStrong-50 dBm (not used in these tests)

3. Onset of message error (OME) definition:

OME is defined as the first operating point (in a test) at which a system exhibits a message completion rate of less than 100 %, or equivalently, the operating point at which a system exhibits a message error rate greater than 0 %.

Sec. To by

4. Onset of additional message error (OAME) definition:

na ha a baha na na na na

OAME is defined as the first operating point (in a test) at which the message completion rate of a system decreases with respect to the message completion rate measured at the OME.

5. Point of failure (POF) definition:

POF is defined as the point where a system exhibits a message completion rate of 90 % \pm 5 %, or equivalently, where a system exhibits a message error rate of 10 % \pm 5 %.

3.0 Test Data

.

843

•

....

Test B-1

28

5. D

Signal Failure with Noise

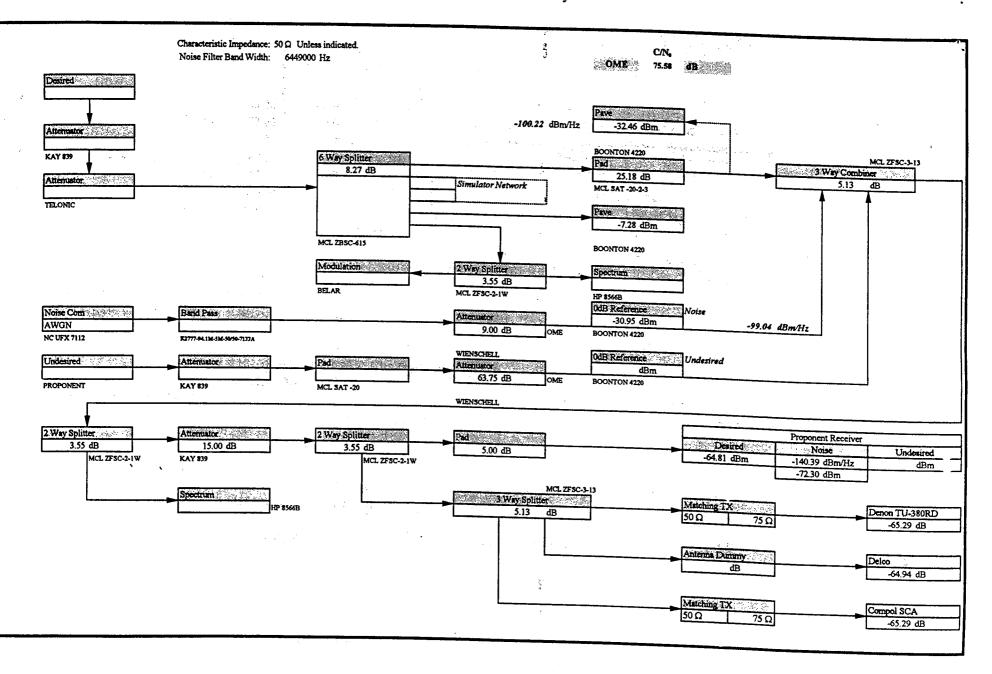
der

.

1985

-,

Digital Radio Test Laboratory



(Mitre)

Level B-1

Digital Radio Test Laboratory

B-1 Additive White Gaussian Noise Characterization of HS Digital Subcarrier Signal Failure

Test Date 7/22/97

Engineer(s): DML

Basic Test Parameters:

SIGNAL

PROPONENT SPECIFIC

Interleaver Level 2

.

COMPOSITE SIGNAL

5-Band Medium Processed

ORBAN #2

COMP OUT 1: Proponent Only

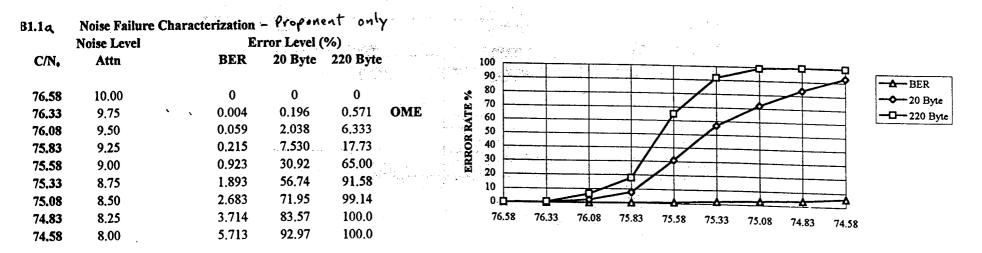
adjusted for 110%

COMP OUT 2: Prop + SCA Main Channel modulation

Center Frequency: 94.1 MHz RF Level: -65 dBm Main Channel Mod: CPN SCA Group: Proponent Only Measurement Duration: 2.5 minutes

Analog Receivers: Delco RX 7

Dayton 67kHz SCA Receiver Denon RX 2 RBDS Receiver W/RDS Check software utilty



1

B-1

File Name: MIT855AA.XLS

Mitre)

ن ا

31.16

Error with other SCAs

Digital Radio Test Laboratory

.

Main Channel Mod: CPN	Noise Level	E	rror Level	(%)	
SCA Group: C C/N.	Attn	BER		220 Byte	an an ann an Anna Anna Anna Anna an
				25.0	and the second
76.33	9.75	0.006	0.269	0.762	
75.33	8.75	1.630	52.55	91.29	
74.58	8.00	4.827	89.08	100.0	and the second
				100.0	n an an Anna an Anna Anna
Main Channel Mod: CPN					
SCA Group: D	Noise Level	E	rror Level	(%)	
C/N.	Attn	BER	1. 1. 1. M. 1. 1. 1. 1.	220 Byte	
76.33	9.75	0.096	3.584	10.43	
75.33	8.75	3.352	79.42	100.0	
74.58	8.00	8.700	98.26	100.0	the second s
i1,2a					
	Dayton AF200-SCA Re	eceiver)		·	
SCA Group: C	S/N			÷ ,	
Main Channel Mod: CPN	(dB)			EO&C	an a
Best Case 67 kHz On	The second se	No MCM	+ 1 · ·		
Best Case 67 kl				RMS with	15kHz Low Pass Filter
RBDS & 67 kH					
Proponent & 67 kH RBDS, Proponent & 67 kH		/		Deviation *	= 5.5 kHz: Fmod=1 kHz
RBDS, Proponent & 67 kB	· · · · · · · · · · · · · · · · · · ·	OME	$\sum_{i=1}^{n}$		
KDD5, Floponent & 07 KD	2 20	UME			
v v		i de la companya de l Esta de la companya de		- Also 🗄	in test F-1
1.26 (not in test procedure)				2109 ··	
Main Channel S/N Rat	in (Denon RX 2)	n data sedan ang sedan seda Sedan sedan sed	÷ .	1	
	S/N	Settle Contract of	•	ę.	
	(dB)	•		DMC	16147-1
SCA Group: No			•	AR tokon	15 kHz Low Pass Filter
Proponent On				VUD LAKEII	with 1 kHz Mod Souce
	C 60.3				
	D 59.7				
C @ OM					: :
	• 1 ⁵ 7				

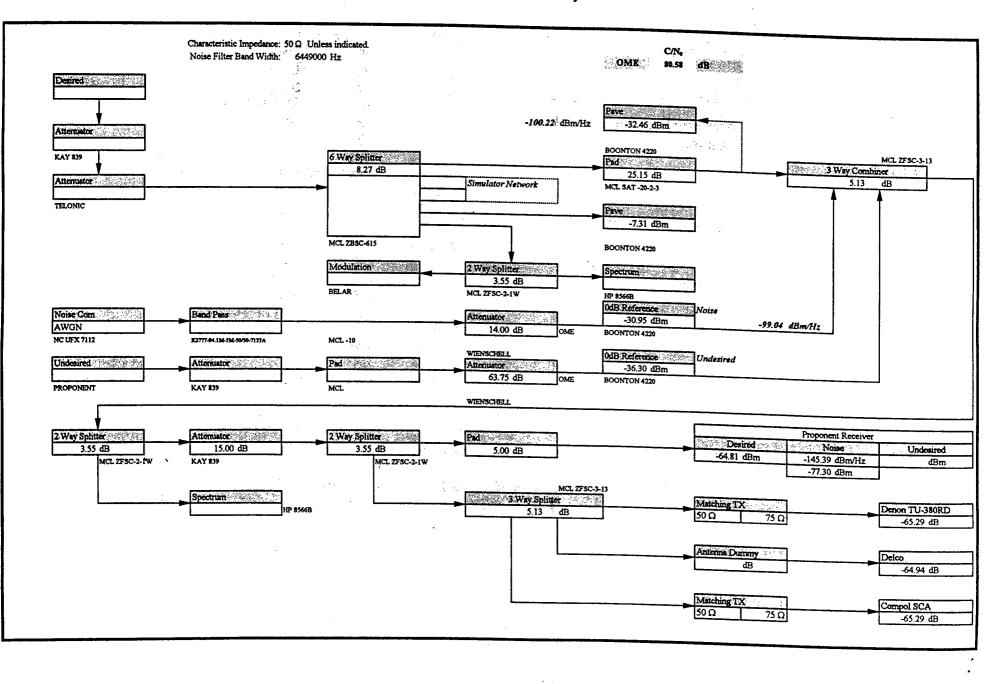
File Name: MIT855AA.XLS

(Mitre)

ſ

•

Digital Radio Test Laboratory



(seiko)

. ----~

	B-1 Additive White	Gaussian N	oise					2400	law	y	Т	st Date		D	
	Characterization of	HS Digital	Subcarrier S	Signal Fai	lure							23/97		Engineer(s):	
	Basic Test Parameters	:	SIG	NAL										DML	
		Center	Frequency:	94.	1 MHz							5		ITE SIGNAL	
			RF Level:		5 dBm									dium Processed	1
		Main Ch	annel Mod.	CPN	nga sa	•			2			CÓ		BAN #2	
			SCA Group:	Proponent	t Only			- 1				COI		1: Proponent O	nly
	:	Measuremen	t Duration:	2.	5 minutes				j.		, s. à . Stat		ME OUI . Isin Cham	2: Prop + SCA	,
			_		•				÷			.	adjusto	nel modulation d for 110%	L
31.1a	Noise Failure Chara				ily								aujusie	a for 110%	
	Noise Level		rror Level (• • •										
C/N.	Attn	BER	20 Byte	220 Byte	;										
83.58		0	0	0											
83.33	16.75	0.011	0.193	1.064	OME	100		1-1-1-			· · · · · · · · · · · · · · · · · · ·	······································	[]	<u></u>	
83.08		0.011	0.193	2.128		90									
82.83	16.25	0.011	0.182	1.000		,,				1-1-1-		+			
82.58		0.051	0.774	4.255		80		╂╌┼╾┼		╉╍╉╸╉	┥┥┥	///			
82.33		0.012	0.196	1.075		70								8	
82.08		0.119	0.484	4.255									╺┼╾┼╾┼╸		BER
81.83		0.114	1.644	8.511		SERROR RATE % 0 05 09	┝ <u></u>	╋╌╋╌╉		╉═┼╾┼╸	+	<u> </u>		A	
81.58		0.182	2.224	12.77	19 A	A 50			_		ار ا		1		
81.33		0.876	3.288	14.89	· • · · ·	No.					F			╺┼╍┾╌┼╌┽╶┥	
81.08		0.267	4.159	25.53	· · · ·	₩ <u>40</u>			┣-┼┼	+	-//				
80.83		0.370	5.029	25.53		. 30					月	4 4 44			
80.58		0.620	6.480	35.11						p-d		1 1			
80.33		0.753	9.873	48.39		20		╋╌┼╼┼	<u> </u>						
80.08		1.126	12.86	55.32		10									
79 .83		<u>1.697</u>	17.00	66.30			\downarrow \downarrow \downarrow	┟╷┟		100	0				
79.58		1.430	17.39	64.13	÷	.0			-8-8-	X-X-X-	<u> </u>	4 4 4			
79.33		3.397	29.37	89.01			83.33 82.83	82.33	81.83	81.33 80.83	80.33	79.33	78.83	78.33 77.83 77.33	
79.08		5.661	34.78	91.30			~ 00	00	80	∞ ∞	8	27 67	78	78.33 77.83 77.33	
7 8.83		4.583	42.42	94.62											
78.58		9.338	58.54	100.00											
78.33		12.17	64.34	100.00		. • • • . •									
78.08		15.46	77.47	100.00				ì							
77 .83		14.58	79.59	100.00											
77 .5 8	11.00	20.92	85.76	100.00											
67 00	10.00	04.00	00.00	100.00											

10.75

77.33

B-1 :

ŧ ٠

24.23

90.28 100.00

٩,

•

Error with other SCAs

31,16

	Main Channel Mod: CPN	Noise Le	vel	Error Level	(%)	
	SCA Group: C	C/N, Attn			220 Byte	
	SCA Group: C		and the second	- 20 Djie	and byte	
		83.33 16.75		. 0		
		80.33 13.75			44.09	
		77.33 10.75			100.0	
		//.33 10./3	22.0	0 91.92	100.0	
	Mate Channel Made CPN	and the second				
	Main Channel Mod: CPN	Noise L	wel	Error Level	(%)	• • • •
	SCA Group: D	C/N. Attn			220 Byte	and the second second
				20 Dyie	ZZU Dyte	
•		83.33 16.75	0.01	1 0.193	1.064	
		and the second				410 A.
		80.33 13.75			63.44	
		77.33 10.75	5 34.2	5 96.36	100.0	с. А.
B1.2a					÷	•
	67kHz S/N Ratio	(Dayton AF	200-SCA Receiver)			
	SCA Group: C		S/N			the second second
	Main Channel Mod: CPN		(dB)		EO&C	
	Best Case 67		46 J No MC	CM		· · · · · · · · · · · · · · · · · · ·
		ase 67 kHz	43			Hz Low Pass Filter
		& 67 kHz	30.61	4	3% KPS	
	Proponent		31.4 (1)		Deviation $= 5.5$	5 kHz: Fmod=1 kHz
	RBDS , Proponent	& 67 kHz	28 /	\backslash		
	RBDS , Proponent	& 67 kHz	25 OME			
					measured	in F-1
		· .		-Also	Marcajor-oc	1 • 1
31.2.6	(not in test procedure))				
	Main Channe	I S/N Ratio (Denor	RX 2)			
	•	an an taon ann an taonach Taoine	S/N		.*	
	· · · · · ·		(dB)		RMS with 15 l	Hz Low Pass Filter
	SCA Group	None	61		0dB taken with	n 1 kHz Mod Souce
		ponent Only	61			•
		C	60.3			
		D	59.7			
		C @ OME	45			

File Name: SEI855AF.XLS

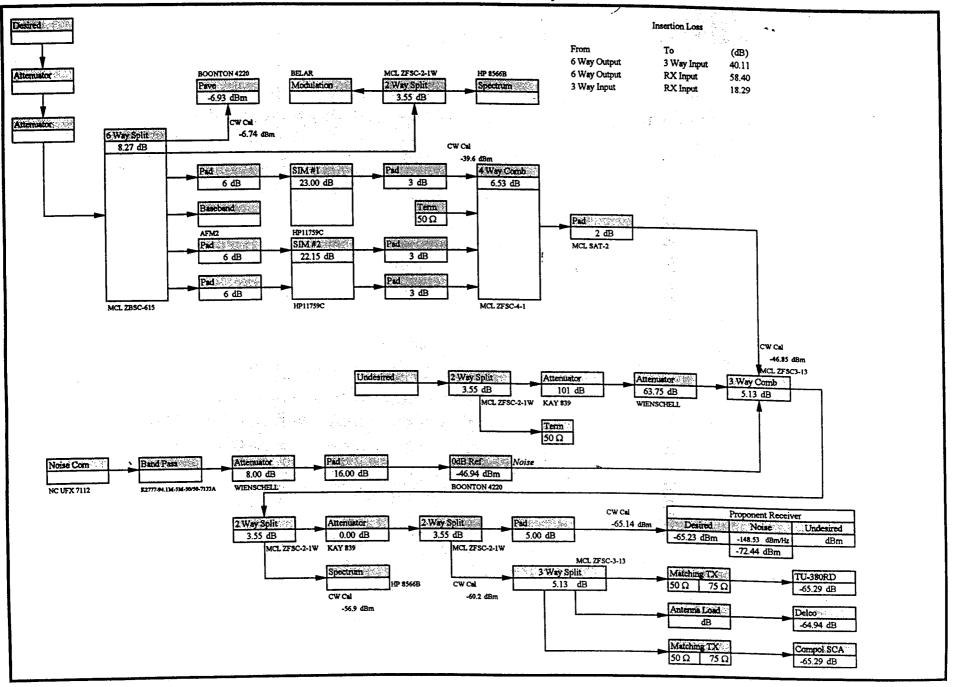
(seiko)

:



Signal Failure with Noise and Multipath

y der



File Name:MIT855AA.XLS

Mitre

Page 5 of 10

B-3 Multipath 7/25/97 Characterization of HS Digital Subcarrier Signal Failure **Basic Test Parameters:** SIGNAL

PROPONENT SPECIFIC

One Path Zero Phase Reference: -65dBm Main Channel Mod: CPN SCA Group: C Analog SCA modulated with ABBA.

Error Measurement Duration: 2.5 minutes

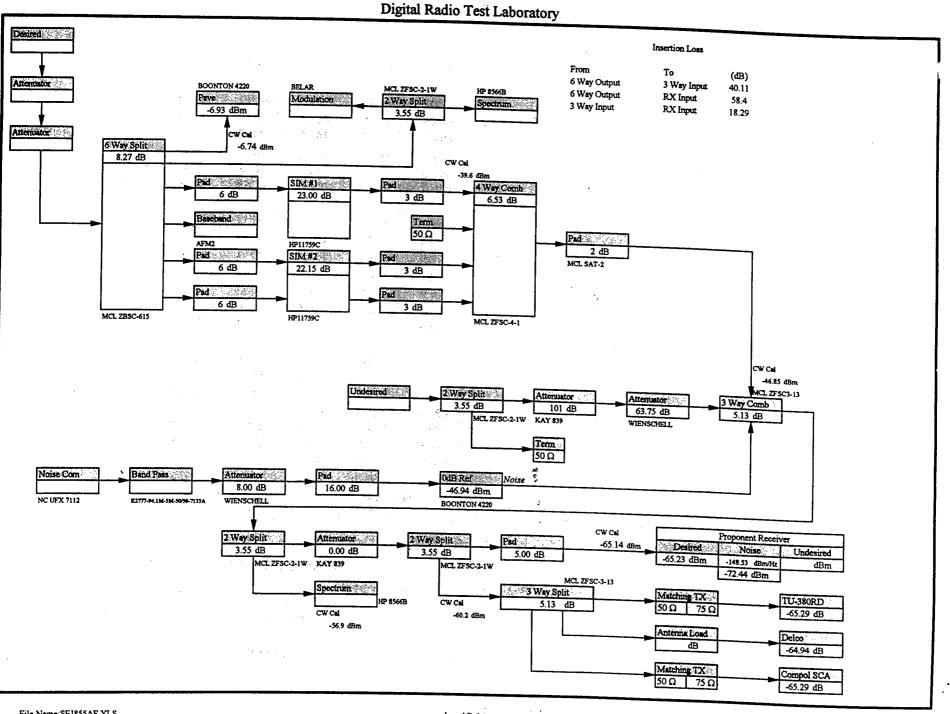
ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% 5 Band Medium Fast Processing

COMPOSITE SIGNAL

	Noise	Level	E	rror Level ((%)			
	C/N.	Attn	BER	20 Byte	220 Byte	••		
Urban Slow	131.93	63,75	0.000	0.000	0.000			
	89.18	21.00	0.000	0.000	0.000			
	88.18	20.00	0.014	0.572	1.867		- -	
	87.18	19.00	0.182	6.727	14.80	1 al		
	86.18	18.00	0.447	15.86	27.87			
	85.18	17.00	1.242	30.68	40.82			
	84.18	16.00	2.295	40.73	51.73			
Urban Fast	131.93	63.7 5	0.000	0.000	0.000			
· .	87.18	19.00	0.000	0.000	0.000			
	86.18	18.00	0.010	0.333	0.941	$\Delta = -2 dB$	(with	ubm slow)
	85.18	17.00	0.179	6.227	14.50	0	Count	urren scor)
	84.18	16.00	1.058	30.37	50.75			
×	83.18	15.00	3.647	73.72	95.25			
	82.18	14.00	8.820	96.41	100.0			
Rural Fast	131.93	63.75	0.000	0.000	0.000			
	90.18	22.00	0.000	0.000	0.000			
	89.18	21.00	0.009	0.304	0.933	N- +1 18	(with	urban show)
	88.18	20.00	0.491	17.24	38.67	1	()
	87.18	19.00	2.850	69.95	96.67			
	86.18	18.00	6.976	95.43	100.0	14. L		
Obstructed	131.93	63.75	49.83	100.0	100.0	ŕ		

File Name: MIT855AA.XLS

ŝ



36

B-3 Multipath

Characterization of HS Digital Subcarrier Signal Failure Basic Test Parameters: SIGNAL

PROPONENT SPECIFIC

1

-

ڊ زير:

One Path Zero Phase Reference: -65dBm Main Channel Mod: CPN SCA Group: C Analog SCA modulated with ABBA. Error Measurement Duration: 2.5 minutes

	Noise	Level	E	rror Level (%)
	C/N.	Attn	BER	20 Byte	220 Byte
Urban Slow	131.93	63.75	4.771	10.91	24.44
	89.18	21.00	15.87	35.84	52.33
	88.18	20.00	19.35	41.88	57 .14
	87.18	19.00	21.25	43.72	63.10
	86.18	18.00	25.38	48.52	65.00
Urban Fast	131.93	63.75	39.41	54.10	96.30
	87.18	19.00	70.51	86.04	100.0
Rural Fast	131.93	63.75	41.55	60.02	96.15
	90.18	22.00	75.65	90.91	100.0
Obstructed	131.93	63.75	99.96	100.0	100.0

COMPOSITE SIGNAL

ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% 5 Band Medium Fast Processing Test B-6

Weak Signal Sensitivity

ļ

B-6 Weak Signal Sensitivity	-	8/26/97			•		
CPN :	91 %			81 %			
pilot:	9%			9%			81 %
proponent:	10 %			10 %			9 %
57 kHz :	0%			3 %	the second		10 %
67 kHz:	0 %			7%			 10 %
Total Injection:	110 %		•	110 %			0%
		÷			.1		110 %
					1	;	

	Proponent Only 23 dB -88 ≤OME< -87 dBm	Group C 23 dB -88 ≤OME< -87	10	Group D 22 dB	Sim
		33 -04	dBm	-87 ≤OME< -86 dBm	Shin
	and the second state of the	1 m (1 - 1			
				e transferier A	
••					
			ġ		
			\$c		
·					
•			£		

Simulator Mode

1

· •.

File Name: MIT855AA.XLS



B-6 Weak Signal Sen	sitivity	8/25/97			
CPN: pilot: proponent: 57 kHz: 92 kHz: Total Injection:	91 % 9 % 10 % % 110 %		81 % 9 % 10 % 3 % 7 % 110 %	÷	81 % 9 % 10 % 10 % % 110 %

Proponent Only 13 dB	Group C 13 dB	Group D
-78 ≤OME< -77 dBm	-78 ≤OME< -77 dBm	dBm
• • • • • • • • • • • • • • • • • • •		
x	анан алан айтай айтай Айтай айтай айта	

· . .

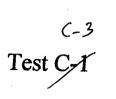
File Name: SEI855AF.XLS

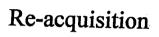
(seika)

..

۲

.





(-3 C-1 Re-Acquisition

8/26/97

Re-Acquisition Time (s)

	11.35	
	17.84	
	12.15	
	16.66	
	15.01	
Average	14.60	
	*	

Desired Signal Level at Receiver -65 dBm

ABBA Used as Modulation Source on Main Channel Medium CHR Processing

File Name: MIT855AA.XLS

•

44

ą h

5 th 20

C-3 *e*-1 Re-Acquisition

8/25/97

	De Annutstat	
	Re-Acquisition Time (s)	
	1	
	2.77 ,	
	2.40	
	2:46	
	2.27	
	2.43	
verage	2.47	

Desired Signal Level at Receiver -65 dBm

ABBA Used as Modulation Source on Main Channel Medium CHR Processing

÷

Test D-1

HSSC \rightarrow Host Analog

enter.

D-1 HSSC -> Host Analog

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:		91 % 9 % 0 % 0 % 0 % 0 % 2.06	V			91 9 0 0 10 110	% % % %		81 9 7 3 10 110	% % % % %		81 9 0 10 10 110	% % % % %
		lot Only				Proponent + Pilot	t	0 dB=	1.86 Group C	<u>v</u>		Group D	
RF Level dBm -65	S/N 50.3	Units dB		•	MITRE S/N (dB) 50.3		SEIKO S/N (dB) 50.2	MITRE S/N (dB) 49.2		SEIKO S/N (dB) 49.2	MITRE S/N (dB) 49.0	-	SEIKO S/N (dB)
-75	47.7	dB			47.7		47.7	46.5		46.5	46.3		<u>49.0</u> 46.3

Measurements made psophometrically (Q-Peak detected with CCIR weighting and 15 kHz low pass filters). 0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R,

Measurements made on Left Channel.

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 8/11/97

File Name: HS855D1.XLS

D-1 HSSC -> Host Analog

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:		91 % 9 % 0 % 0 % 100 % 2.37	V		91 9 0 10 110		0 dB=	81 9 7 3 10 110 2.15	% % % % % V		81 9 0 10 10 10	% % % % %
	J	Pilot Only			Proponent + Pilot			Group C			Group D	
RF Level dBm -65	S/N 56.3	dB		MITRE S/N (dB) 54.1		SEIKO S/N (dB) 52.7	MITRE S/N (dB) 53.6		SEIKO S/N (dB) 52.2	MITRE S/N (dB) 52.5		SEIKO S/N (dB) 51.7
-75	55.2	dB dB		54.2	L.,	53.3	54.1		53.3	53.5		52,6

Measurements made Q-Peak detected with CCIR weighting and 15 kHz low pass filters (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

`

Tests Conducted: 8/11/97

D-1 HSSC -> Host Analog

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:	91 % 9 % 0 % 0 % 100 % 0 dB= 757.0	mV		91 9 0 0 10 110	% % % %		81 9 7 3 10 110	% % % %		81 9 0 10 10 10	% % % %
RF Level	Pilot Only			ponent Pilot		0 dB=	682.0 Group C	mV		Group D	
dBm -65 -75	S/N Units 48.7 dB 39.0 dB		S/N (dB) 48.5		SEIKO S/N (dB) 48.7 39.0	MITRE S/N (dB) 47.7 38.0		SEIKO S/N (dB) 47.7 38.0	MITRE S/N (dB) 47.6 38.0		SEIKO S/N (dB) 47.6

ş

f

Measurements made Q-Peak detected with CCIR weighting filter (psophometric). 0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R. Measurements on Left Channel Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation Unit Not in Screen Box

Clipped Pirtk Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 8/11/97

File Name: HS855D1.XLS

Denon TU-380RD

1. S. 1. S.

D-1 HSSC -> Host Analog

		91 % 9 % 0 % 0 % 0 % 00 % 654.0	mV			91 9 0 10 110		0 dB=	81 9 7 3 10 110 588.0	% % % % % %		81 9 0 10 10 10	% % % % %
i sense se s	Pi	lot Only				Proponent + Pilot	*		Group C			Group D	
RF Level dBm -65	<u>S/N</u> 52.5	Units dB			MITRE S/N (dB) 52.0		SEIKO S/N (dB) 52.3	MITRE S/N (dB)		SEIKO S/N (dB) 50.6	MITRE S/N (dB) 50.2		SEIKO S/N (dB) 50.5
-75	43.0	đB	energy Charles and	2015 1. 1. 1.	43.0		43.0	41.9		41.9	41.9		41.9

Measurements made Q-Peak detected with CCIR weighting and 15 kHz low pass filters (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation Orban #2 Composite output #2 Set for 81% Main Channel Modulation Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML Tests Conducted: 8/11/97

File Name: HS855D1.XLS

Pioneer SX-201

i No No

Test D-3

HSSC \rightarrow Host Analog w/distortion

2...

D-3 HSSC -> Ho	st Analog w	rith RF Distor	rtion						
Main Channel:	91		·		91	%	•	81	%
Pilot:		%			9	%		9	%
92 kHz:		%			0	%		0	%
57 kHz:		%			0	%		10	%
Proponent:		%			10	%		10	%
Total:	100	%			110	%		110	%
					······································				
		Pilot Only			Proponen	t		Group C	· · · · · · · · · · · · · · · · · · ·
	RF Level			MITRE		SEIKO	MITRE		SEIKO
	(dBm)	S/N (dB)		S/N (dB)		S/N (dB)	S/N (dB)		S/N (dB)
No Distortion	-61.7	50.4		50.4		50,4	49.4		49.5
Narrow Band	-61.6	50.6		50.5		50.6	49.5		49.6
	4 • •								
No Distortion	-63.0	50.7		50.7	*****	50.7	49.7		49.7
	<i></i>								
Moderate Slope	-63.5	50.8		50.8		50.8	49.7		49.7
	(2.2	50.0							
Large Slope	-63.3	50.8		50.8		50.8	49.7		49.7

. 4

Measurements made psophometrically (Q-Peak detected with CCIR weighting and 15 kHz low pass filters). 0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation for Group C measurements.

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 8/21/97

.

٠.

D-3 HSSC -> Ho	ost Analog v	vith RF Dist	ortion						
Main Channel: Pilot: 92 kHz:	91 91 0 0 0 0 0 0	% % %			91 9 0 0 10 110	-% % % % %		81 9 0 10 10 10	% % % %
		Pilot Only			Proponen	t		Group C	
No Distantian	RF Level (dBm)	S/N (dB)		MITRE S/N (dB)	2 ¹	SEIKO S/N (dB)	MITRE S/N (dB)		SEIKO S/N (dB)
No Distortion	-61.7	56.3		54.1		52.9	53.3		52.0
Narrow Band	-61.6	56.3		54.8		54.3	53.5		53.0
No Distortion	-63.0	56.4		54.2		53.0	53.3		52.0
Moderate Slope	-63.5	56.3		54.3		53.4	53.5		52.6
Large Slope	-63.3	56.3		54.3		53.6	53.4		52.5

• Measurements made psophometrically (Q-Peak detected with CCIR weighting and 15 kHz low pass filters). 0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation for Group C measurements.

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 8/21/97

Ċ,

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:	9 0 0 0	% % % % %		91 9 0 10 110	% % % %	. · ·	81 9 0 10 10 110	% % % %
	:	Pilot Only		Proponent	· · · · · · · · · · · · · · · · · · ·		Group C	
No Distortion	RF Level (dBm) -61.7	S/N (dB) 50.5	MITRE S/N (dB) 50.3		SEIKO S/N (dB) 50.5	MITRE S/N (dB) 49.5		SEIKC S/N (de
Narrow Band	-61.6	50,6	50,5		50,6	49.4		49.6 49.7
No Distortion	-63.0	49.9	49.6		49.8	48.7		49.0
Moderate Slope	-63.5	49.3	49.2		49.3	48.3		48.4
arge Slope	-63.3	49.4	49.2		49.4	48.4		48.6

D-3 HSSC -> Host Analog with RF Distortion

Measurements made Q-Peak detected with CCIR weighting filter (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation for Group C measurements.

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 8/21/97

١

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent:	0	% %			91 9 0 0	% % %		81 9 0	% % %
Total:	100 Г	% %	· ·		10 110	% %		10 10 110	%
. · · ·	RF Level	Pilot Only			Proponent			Group C	%
No Distortion	(dBm) -61.7	S/N (dB) 55.5		MITRE S/N (dB) 54.3	i i i i i i i i i i i i i i i i i i i	SEIKO S/N (dB) 55.0	MITRE S/N (dB) 52.3		SEIKO S/N (dB)
Narrow Band	-61.6	55.6		55.1		55.5	53.6		52.8
No Distortion	-63.0	54.8		53.7		54.2	51.8		53.8
Moderate Slope	-63.5	54.1		53.0		53.6	51.2		52.3
Large Slope	-63.3	54.2		52.9		53.6	51.0		51.6 51.5

D-3 HSSC -> Host Analog with RF Distortion

Measurements made psophometrically (Q-Peak detected with CCIR weighting and 15 kHz low pass filters). . 0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R. Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation for Group C measurements.

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

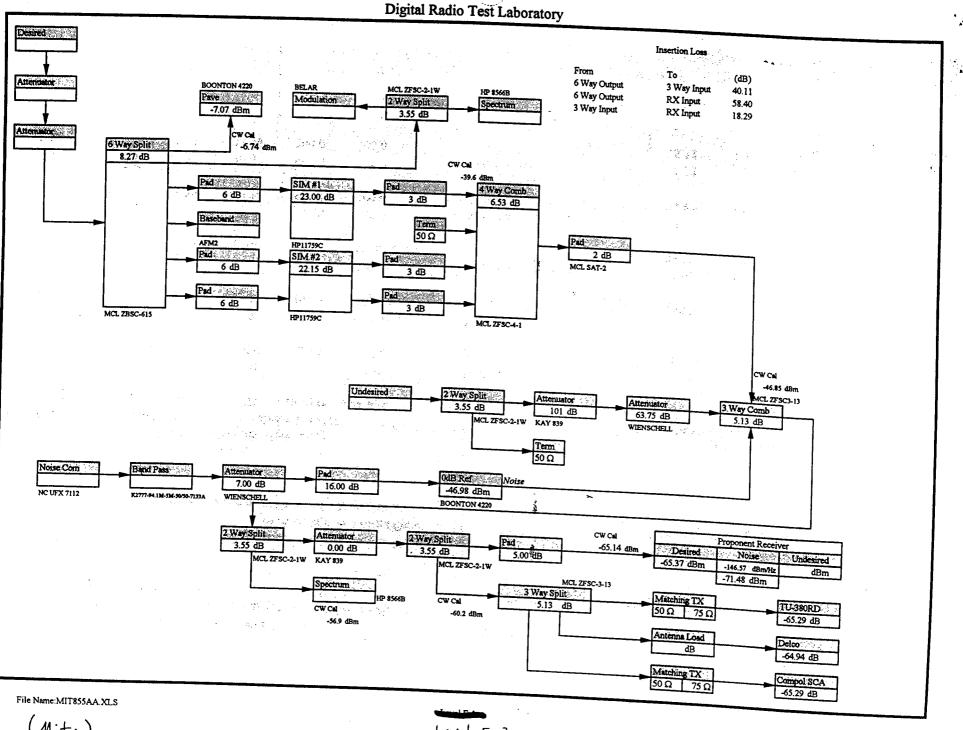
Tests Conducted: 8/21/97

Test E-3

56.

Host Analog \rightarrow Digital Subcarrier

į



(Mitre)

E-3 ■ Host Analog -> HSSC with RF Distortion Characterization of HS Digital Subcarrier Signal Failure Basic Test Parameters: SIGNAL

8/26/97

PROPONENT SPECIFIC

COMPOSITE SIGNAL

Main Channel Mod: Silence or Music SCA Group: Proponent Only Error Measurement Duration: 2.5 minutes

÷.,

ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% Medium Contemporary Hit Radio

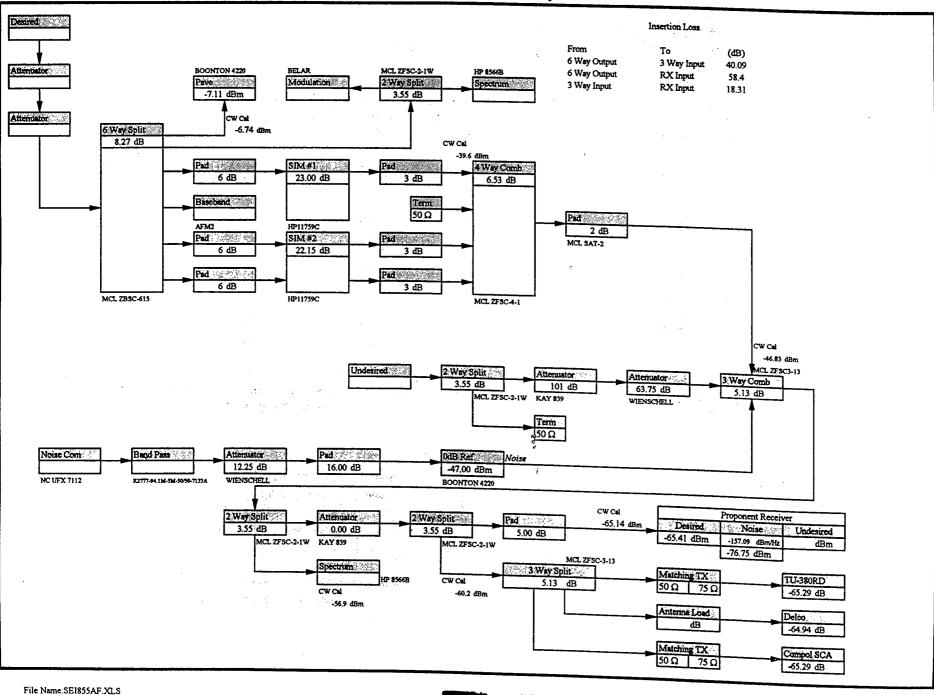
		No Main	Channel M	Iodulation				ARRA M.		••••	
CW Calibration	Noise 1	Level	E	rror Level ((%)		Noise	Level		Modulatio	
Level @ RX	C/N.	Attn	BER	20 Byte	220 Byte	•	C/N,			rror Level (
(dBm)								Attn	BER	20 Byte	220 Byte
-60.5	76 .3 7	3.50	0.001	0.073	0.267	Undistorted RF Path	76.87	4.00			
-60.5	75.37	2.50	1.008	33.15	65.33			4.00	0.002	0.073	0.267
							75.87	3.00	1.013	34.42	70.00
-60.4	76.47	3.50	17.60	99.79	100.0	Narrow Band	76.97	4.00	11.01		
-60.4	75.47	2.50	32.52	100.0	100.0		75.97		11.81	99.45	100.0
			1. 1897 1. 1997				13.31	3.00	26.99	99.98	100.0
-61.6	76.02	4.25	0.007	0.231	0.667	Undistorted RF Path	76.52	4.75	0.000		
-61.6	75.02 ``	3.25	1.910	56.79	90.00		75.52		0.009	0.365	1.333
			1997 - 1997 -			4	13,32	3.75	1.745	54.87	91.73
-62.2	75.42	4.25	14.95	99.88	100.0	Moderate Slope	75.92	4.75	10.00		
-62.2	74.42	3.25	30.34	99.99	100.0	· · · · · · · · · · · · · · · · · · ·			10.70	99.09	100.0
							74.92	3.75	24.65	100.0	100.0
-62.0	75.62	4.25	20.60	99.99	100.0	Large Slope	76.12	4.75			
-62.0	74.62	3.25	35.59	100.0	100.0	U I		4.75	15.28	99.84	100.0
							75.12	3.75	31.65	100.0	100.0
			· · · · ·	· · · ·							

File Name: MIT855AA.XLS

(Mitre)

j.

¢,



(seiko)

ڼ

.

E-3

■ Host Analog → HSSC with RF Distortion Characterization of HS Digital Subcarrier Signal Failure Basic Test Parameters: SIGNAL

No Main Channel Medulation

One Path Zero Phase Reference: -65dBm Main Channel Mod: CPN SCA Group: Proponent Only Error Measurement Duration: 2.5 minutes

PROPONENT SPECIFIC

8/25/97

COMPOSITE SIGNAL

ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% Medium Contemporary Hit Radio

		No Main	Channel M	lodulation				ARRA Mo		34	
CW Calibration	Noise	Level	E	ror Level (%)		Noise	Lovol		Modulatio	
Level @ RX	C/N.	Attn	BER	20 Byte	220 Byte					rror Level (%)
(dBm)					-		C/N,	Attn	BER	20 Byte	220 Byte
-60.5	80.91	8.00	0.023	0.387	2.128	Undistorted RF Path	82.41	9.50	0.005		
-60.5	79.91	7.00	1.748	4.493	20.43	2	81.41		0.097	0.097	1.064
- -				·.		.3	01.41	8.50	0.148	1.547	8.511
-60.4	81.01	8.00	11.78	67.27	100.0	Narrow Band	82.51	9.50			
-60.4	80.01	7.00	34.15	95.89	100.0		81.51		7.873	47.58	97.78
	,	•	******				01.51	8.50	16.70	75.96	100.00
-61.6	81.06	9.25	0.011	0.193	1.064	Undistorted RF Path	82.06	10.00			
-61.6	80.06	8.25	0.233	2.998	14.89			10.25	0.017	0.193	2.128
							81.06	9.25	0.125	1.934	11.70
-62.2	80.46	9.25	0.633	9.286	46.24	Moderate Slope	81.46	10.25			
-62.2	79.4 6	8.25	5.696	39.92	94.57	an the set of the set			1.461	9.973	37.63
				a a ser a	and a second second Second second		80.46	9.25	4.261	33.04	86.02
-62.0	80.66	9.25	1.921	8.407	33.33	Large Slope	81.66	10.25			
-62.0	79.66	8.25	4.412	33.70	90.22	- •		10.25	1.303	8.124	41.49
							80.66	9.25	2.964	25.34	76.60

5-3

(seiko)

Page 10 of 10

:6

Test F-1

$\mathrm{HSSC} \twoheadrightarrow \mathrm{Analog} \ \mathrm{SCA}$

......

(e 1

(These results superceded by 12/17/97 data which fillows)

F-1 HSSC -> Analog SCA

F-1	HSSC -> Analog SCA					Test Date:	7/28/97			Engineer(s):	DML
Mai	n Channel: Pilot: 67 kHz;	Group C 81 % 9 % 7 % 3 %		(67 k4e r pilt aly <u>Main Channel Off</u> 0% 9% 7%		HSSC & 1 81 9	RBDS Off	81 9	%	81	S Off % %
	57 kHz:3 %Proponent:10 %Modulation:110 %		جد 0 0 الار ما ا	% % %	0	% %	3	% % %	7 % 0 % 10 % 107 %		
		67 kHz S/N (dB) Medium Weak		67 kHz S/N (dB)		67 kHz S/N (dB)		67 kH (d	z S/N B)	67 kH	z S/N B)
┠		Ivicululii	Weak	Medium	Weak	Medium	Weak	Medium	Weak	Medium	Weak
	SEIKO:	28.0 ✓	27.5	46.0 √	37.0	43.8 🗸	36.2	30.8 √	29.8	31.5 √	30.3
	MITRE:	29.9 1	29.0							36.5 ✓	33.5

Main Channel: Clipped Pink Noise

67 kHz: 1 kHz THD+Noise: 2.2 %

S/N measurements made RMS detected with 15kHz low pass filter.

Ą

F-1	HSSC -	•>	Analog	SCA
------------	--------	----	--------	-----

(67 kHz rpilot mby) Test Date: 7/28/97 (Main +67 kHz alla)

					(MIALA +	or knead	クノ			
Main Channel:		ıp C		annel Off	HSSC &	RBDS Off	HSS	C Off	RBL	S Off
Pilot: 67 kHz: 57 kHz: Proponent: Total Modulation:	9 7 3	% % % %	9 7 0 0	% % % %	81 9 7 3 0	81 % 9 % 7 % 3 % 0 % 100 %		% % % %	81 9 7 0	% % % %
	67 kH (df Medium	z S/N 3)		z S/N B)	67 kH (d	z S/N	100 % 67 kHz S/N (dB)		107 67 kH	
SEIKO:	28.0	Weak 27.5	Medium	Weak	Medium	Weak	Medium	Weak	Medium 31.5	Weak 30.3
MITRE:	29.9	29.0	46.0	37.0	43.8	36.2	30.8	29.8	36.5	33.5

Receiver: Dayton production model.

Main Channel: Clipped Pink Noise

67 kHz: 1 kHz THD+Noise: 2.2 %

S/N measurements made RMS detected with 15kHz low pass filter.

THD+Noise measurement made RMS without filter. Revised (12-17-97) to reflect 0% 57kHz injection under Main Channel Off condition. (Attach mont

2

0

 \sim

Д

F-1 HSSC -> Analog SCA

۰...

Test Date: 12/17/97

Engineer(s): DML, TK

	Grou	the second se		annel Off	HSSC &	RBDS Off	HSS	C Off	RBD	S Off	
Main Channel:		81 %		0 %		81 %		81 %		81 %	
Pilot:		9 %		9 %		9 %		9%		9%	
67 kHz: 57 kHz:		%		%		%	7	%		%	
Proponent:		%		%		%	3	%	0	%	
Total Modulation:	10 110		1	%		%		%	10	%	
- • • • • • • • • • • • • • • • • • • •	110	70	16	%	97	%	100	%	107	%	
	67 kHz	z S/N	67 1-11	C S MI	(71)	0.01					
		(dB)		67 kHz S/N (dB)		67 kHz S/N (dB)		67 kHz S/N (dB)		67 kHz S/N	
	Medium	Weak	Medium	Weak	Medium	Weak	Medium	Weak	(d. Medium	B) Weak	
077740								- Weak	Wiediulli	weak	
SEIKO:	45.5	40.0							47.1	40.4	
			50.0	41.5	49.6	41.2	47.8	40.8			
MITRE:	46.0	40.0									
							1 1		47.2	40.4	

Receiver: Dayton modified

Main Channel: Clipped Pink Noise

67 kHz: 1 kHz THD+Noise: 2.85 %

S/N measurements made RMS detected.

Subcarrier receiver modified to provide narrow band characteristics.

Additional test to demonstrate narrow band subcarrier receiver performance.

626

Test F-2

HSSC \rightarrow RDS Subcarrier

(Data invalid - see following data sheets)

F-2 HSSC -→RBDS	Test Date:	7/28/97	7	Engineer(s):	DML		_		
	Gro	up C	` ٦	(67 KH3		-	(MSSC +	- N95)	
Main Channel:	81		1		C Off	·	67 kł	Iz Off	
Pilot:		%		81	% %		81	%	
67 _92'kHz:		%			% %		9	%	
57 kHz:		%		1	76 %		0	%	
Proponent:	10				%			%	
Total Deviation:	110	%		100			10		
				1 100	/0		103	%	
	RBDS Block Error			RBDS Block Error					
		(%)		(%			RBDS Block Error		
	Medium	Weak	1	Medium	Weak	-{· ·	(?	6)	
					Weak		Medium	Weak	
SEIKO:	14	19				·	10		
				16	16		13	18	
		.*		ų.					
MITRE:	18	16					11	10	
							**	13	
Main Channel: Clinned Di-	ale Maine								
Main Channel: Clipped Pin Noise Attenuator: 8.00				oise		Signal F	Reference		
	τω Δ			3 Ref		V in		out	
			-30.97	dBm	-32 50	dBm	6W out -7.30 dBm		

Errors accumulated over a 2.5 minute measurement period. EBU SQAM Disk Track 69 (ABBA) used to exercise the 67 kHz subcarrier.

-65 dbm at receiver

File Name: HS855F.XLS

1.00

<u>,</u> \$

F-2 HSSC ->RBDS	Test Date:	7/28/97	Engineer(s): (67 kHz	DML	(HSSC ;	rais)
Main Channel: Pilot: 67 92 kHz: 57 kHz: Proponent: Total Deviation:	81 9 7 3	% % % % % % %	HSS 81 9 7 3 0	C Off % % % % %	67 kl 81 9 0 3	* 1(AS) ½ Off % % % % % %
	RBDS B	lock Error (6) Weak	 1	% ock Error 6) Weak	 L	ock Error 6)
SEIKO:	14	19	16	16	13	Weak
MITRE:	18	16			11	13
Main Channel: Clipped `Noise Attenuator: 8	Pink Noise .00 dB		vise B Ref	3₩	Reference	

"Noise Attenuator:			INO1Se	Signal Reference		
Noise Attenuator:	8.00 dB		0 dB Ref	3W in	6W out	
	74.56 dB Hz	C/No	-30.97 dBm	-32.50 dBm	-7.30 dBm	

Errors accumulated over a 2.5 minute measurement period. EBU SQAM Disk Track 69 (ABBA) used to exercise the 67 kHz subcarrier. Revised (12-17-97) to include C/No performance calculation.

(-65 dbm at receive input)

File Name: Hs855f_a

· • ---

	Gro	up C		HSS	C Off	ן	6714	In Off	
Main Channel:	81	%		the second division of	%	1	67 kHz Off 81 %		
Pilot:	9	%		9 % 7 %			9%		
67 kHz:		%							
57 kHz:		%		3	%			%	
Proponent:	10			0	%		10		
Total Deviation:	110			100			103	-	
		Ma	ximum Bloo	k Error Inde	ependent of H	Error Correc	ction	<u></u>	
		RBDS Block Error (%)		RBDS Block Error (%)			RBDS Block Erro (%)		
	Medium								
	Iviculuin	Weak		Medium	Weak		Medium	Weal	
SEIKO:	6	7		6	7		6	6	
MITRE:	6	8					7	8	
Denon TU380-RD re	ceiver modificat	ion removed	on 12-10-9	7 and re-teste			<u></u>		
Main Channel: Clipped	Pink Noise			ise	2U .	Signal	Reference		
oise Attenuator: 7	.50 dB			Ref	3W			out	
74	.63 dB Hz	C/No		dBm -32.66 dBm			6W out -7.44 dBm		

Errors accumulated over a 2.5 minute measurement period. EBU SQAM Disk Track 69 used to exercise the 67 kHz SCA.

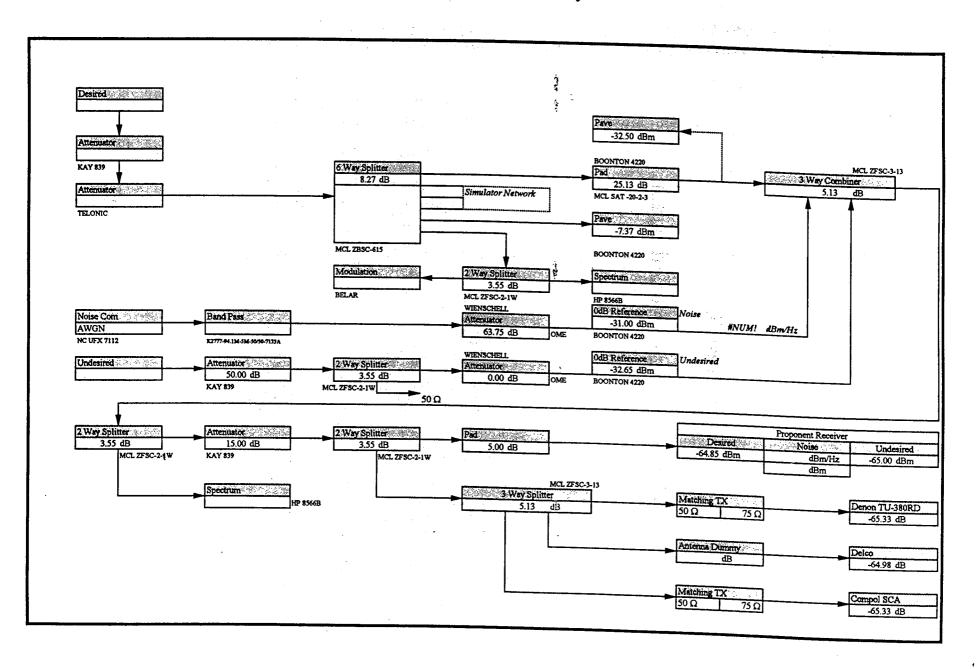
Revised (12-17-97) to include C/No calculation.

.

4

Test G

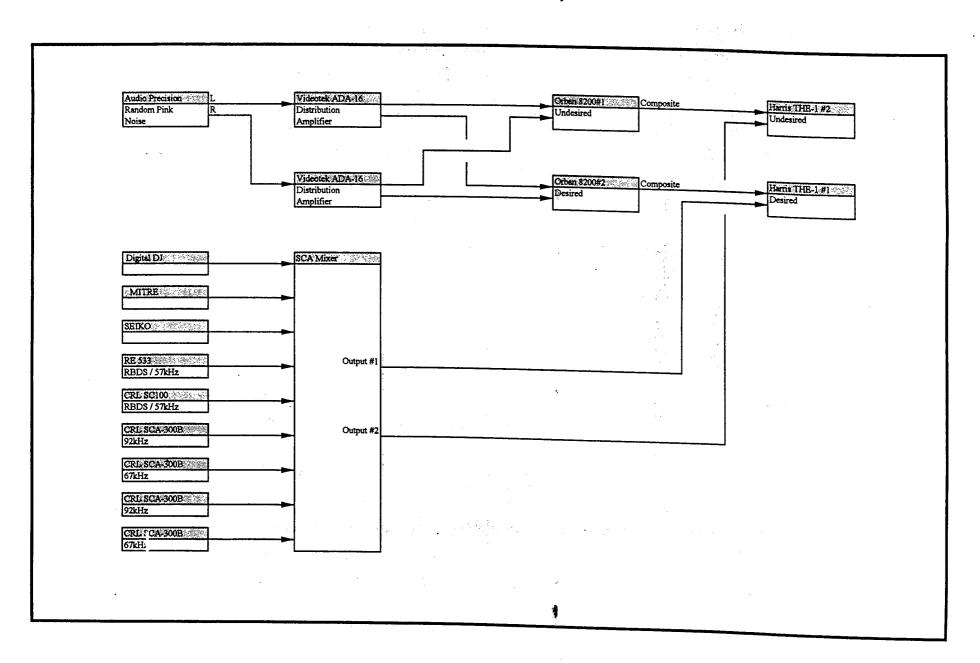
Interference tests - block diagram



÷

t

9`ð



File Name:HS855G.XLS Index: COMP



1

)

1st Adjacent Channel Interference

Digital Radio Test Laboratory (Desired - 94.1 MHZ)

G-1			er First Adj	acent		n trans en	Upp	er First Adja	icent	an shekara na saƙƙ	n an an Araban an Ar Araban an Araban an Ar Araban an Araban an Ar
	Analog -> HS		93.9 MHz			Analog -> HS		94.3 MHz			
		Desired	Undesired			•	Desired	Undesired		Clipped nin	k noise on undesired subcarriers.
N	Main Channel:	81	81	%	Ma	in Channel:	81	81	%	ABBA on I	Desired analog subcarrier.
	Pilot:	9	9	%		Pilot:	9	* 9	%		subcarrier.
	67 kHz:	7	10	%		67 kHz:	7	10	%		
	92 kHz:	0	10	%		92 kHz:	0	10	%		
	57 kHz:	3	0	%		57 kHz:	3	0	%		
~	Proponent:	10	0	···· ··· %	- Vi - 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Proponent:	· · · 10 ·	0	%	1.1. A.B. 1	
10	otal Deviation:	110	110	%	Tota	l Deviation:	110	110	%		
	A 777777		Lower 1st	-			MITRE	Upper 1st A	djacent		8/6/07
	ATTN	D/U	BER	20 Byte	220 Byte	ATTN	D/U	BER	20 Byte	220 Byte	8/6/97 FO&C
	(dB)	(dB)	(%)	(%)	(%)	(dB)	(dB)	(%)	(%)	(%)	2000
	13.50	-6.35	0.026	0.985	3.067	9.50	-10.35	0.009	0.365	1.067	
	12.50	-7.35	13.35	99.78	100.0	8.50	-11.35	0.318	11.64	25.07	
Fre us .			• • • • • • • • • • • • • • • • • • •			7.50	-12.35	1.539	44.18	67.07	
+ 6 plu						6.50	-13.35	4.003	78.92	97.26	
× (*	L					5.50	-14.35	9.517	96.64	100.0	
critow	[SEIKO	Lower 1st	diacont							
WIND	ATTN	、D/U	BER	20 Byte	220 Byte	ATTATAT	SEIKO	Upper 1st A			8/5/97
	(dB)	(dB)	(%)	(%)	(%)	ATTN (dB)	D/U (đB)	BER (%)	20 Byte (%)	220 Byte (%)	12121
	8.50	-1.35	0.011	0.193	1.064	10.50	0.65	0.125	0.580	3.191	Clean at 9.0 dB. Upper 1st OME, Clean at 11.0 dB
	7.50	-2.35	0.745	1.257	2.128	9.50	-0.35	0.102	1.451	8.511	sinds, clean at 11.0 db
	6.50	-3.35	1.041	3.675	12.77	8.50	-1.35	43.03	94.74	100.0	
	5.50	-4.35	12.31	62.83	100.0	7.50	-2.35				
	4.50	-5.35	94.55	100.0	100.0	6.50	-3.35				

File Name: HS855G.XLS

.

G-1 First Adjace		7/30/97	• . •	- 			and a second	· .
	Desired	SSC -> Analog Undesired		Desired	Undesired		Desired Unde	sired
Main Channel:	81	81	%	81	81	%	01	
Pilot:	9	9	%	9	9	-%	8 18	-, /0
67 kHz:	10	10	%	10	0	%	10	%
92 kHz:	10	10	%	10	7	%	10 () %
57 kHz:	0	0	%	0	3	%	10 () %
Proponent:	0	0	%	0	10	%		· /u
Total Deviation:	110	110	%	110	110	%		70
						70	110 11	l0 %
3 W Input	-32.4	-32.4	dBm	Main Chan	nel measurem	ents are O_D	ark detected with Corr	
Kay #3		51.0	dB	SCA Meas	urements are R	MS detected	eak detected with CCIR and 19	5 kHz low pass f

k detected with CCIR and 15 kHz low pass filters.

SCA Measurements are RMS detected with 15kHz low pass filter. Best Case Main Channel S/N=50dB.

Clipped Pink Noise on the Undesired main and sub carriers.

At 5 dB D/U S/N measurements vary from 35 - 47 dB. Lower 1st. 92 kHz 0dB signal measurement 3 dB low.

Upper 1st.

G-1.3

18.6

G-1.4

	Ar	alog -> Anal	log		HSSC -> Analog			TT	000		
94.3 MHz		Reference				Group C	· ·	<u>n</u>	SSC -> Analo	og	
(upper)	D/U (dB)	S/N (dB)	S/N (dB)		D/U (dB)	S/N (dB)	S/N (dB)	D/U (dB)	Group D		
CAPT /	s/n=45dB	67 kHz	92 kHz		s/n=45dB	67 kHz	92 kHz	s/n=45dB	S/N (dB) 67 kHz	S/N (dB)	
							st.	500	07 KHZ	92 kHz	
		•••			0	30	26	0	31	26	
	\ 0	28	25	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1					JI	25	MITRE:
						31	27	0	32	25	
			· · ·		11					25	SEIKO:

	Analog -> Analog				Н	SSC -> Anal	og		TT	000		
93.9 MHz		Reference	· .			Group C	<u> </u>	1	<u>н</u>	SSC -> Analo	og	
(lower)	D/U (dB) s/n=45dB	S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group D S/N (dB) 67 kHz	S/N (dB) 92 kHz	
	5	28	32	•	5	29	33		5	29	33	MITRE:
					5	29	34	L	5	29	34	SEIKO [.]

File Name: HS855G.XLS

Digital Radio Test Laboratory

G-1 First Adjac		7/31/97 SC -> Analog									
	Desired	Undesired	-	Desired	Undesired	·		Desired			
Main Channel:		81	%	· 81	81	ý %			Undesired		
Pilot:	9	9	%	··· 9	9	* %	•	81	81	%	
67 kHz:	10	10	%	10	0	%		9	9	%	
92 kHz:	10	10	%	10	7	%		10	0	%	
57 kHz:	. 0	0	%	0	3	%		10	0	%	
Proponent:	0	0	%	0	10	%		0	10	%	
Total Deviation:	110	110	%	110	10	%		0	10	%	
					110	70		110	110	%	
3 W Input	-32.4	-32.4	dBm	Main Chan	nel menore						
Kay #3		51.0	dB		irements are	nents are Q-J	Peak detecte	d with CCIR	filter .		
•		18.6		UCA Meds	mements are	RMS.					
		G-1.3									
	A	nalog -> Anal	09	Ľ	ISSC -> Anal	-	<u> </u>				
94.3 MHz	[Reference	-8]		og	1	H	SSC -> Anal	19	
1 -	D/U (dB)	S/N (dB)	S/N (dB)	D/U (dB)	Group C				Group D	<u></u>	
(uppn)	s/n=45dB	67 kHz	92 kHz		S/N (dB)	S/N (dB)		D/U (dB)	S/N (dB)	S/N (dB)	
			72 KIL	s/n=45dB	67 kHz	92 kHz		s/n=45dB	67 kHz	92 kHz	
										<u> </u>	
	21	44	46	21	45	、47		21	45	46	
		44	70	21						40	MITRE:
	<u> </u>			21	45	47		21	45	46	SEWO
					`					40	SEIKO:
	Aı	nalog -> Anal	og	L	SSC -> Anal						
93.9 MHz	*	Reference			Group C	<u>ug</u>		H	SSC -> Analo)g	I
	D/U (dB)	S/N (dB)	S/N (dB)	D/U (dB)	S/N (dB)	\$/N (dB)			Group D	<u> </u>	
(Lower)	s/n=45dB	67 kHz	92 kHz	s/n=45dB	• •			D/U (dB)	S/N (dB)	S/N (dB)	
·		2 · • • • • • • • • •	~ ~ ANA 144	S/1-430B	67 kHz	<u>92 kHz</u>		s/n=45dB	67 kHz	· · · ·	
									ST MIL	92 kHz	
	36	46	52	36	46	52		36	46	60	
	20	70	52	26		T				52	MITRE:

36 46

File Name: HS855G.XLS

`···

52

36

46

52

 \neg

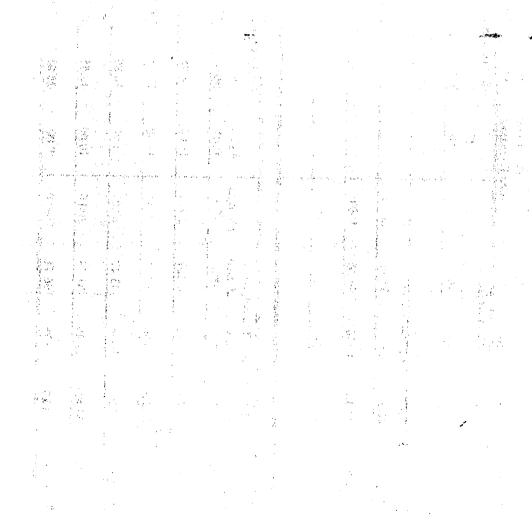
SEIKO:

	Desired	Undesired			Desired	Undesired			Desired	Undesired		
Main Channel:	81	81	%		81	81	%		81	81	%	
Pilot:	9	9	%	4 - F		9.	-%		9	9	%	
67 kHz:	10	10	%	-	10	0	%		10	0	20	
92 kHz:	10	10	%		10	7	%		10	0	%	
57 kHz:		0	%		0	3	%		0	10	%	
Proponent:	. 0	0.	%		0	10	[,] %		0	10	%	
Total Deviation:	110	110	%		110	110	%		110	110	%	
3 W Input Kay #3	-32.4	-32.4 51.0 18.6 G-1.3	dBm dB		SCA Measu	irements are	ments are Q-I RMS.	G-1.4	a with CCIR	filter .		
	AI	nalog -> Anal	og		H	ISSC -> Anal	log	·····	H	SSC -> Anal		
94.3 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group C S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group D	S/N (dB) 92 kHz]
	14	40	40		11	39	38		11	40	37	1
					11	40	39		11	40	38	

	<u>, Ai</u>	alog -> Alla	log	r	<u> </u>	SSC -> Anal	og	HSSC -> Analog				
93.9 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group C S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group D S/N (dB) 67 kHz	S/N (dB) 92 kHz	
	24	42	48	:	24	43	49		24	43	49	MITRE:
					24	43	49		24	43	49	SEIKO:

2nd Adjacent Channel Interference

Test G-2



•

G-2.5		Lowe	r Second Ad	ljacent			Upp	er Second Ad	igcent				
	Analog -> HS		93.7 MHz			Analog -> H	SSC	94.5 MHz	Juccut				
		Desired	Undesired			-	Desired	Undesired					
Ma	in Channel:	81	81	%	Ma	ain Channel:	81	81	%				
	Pilot:	9	9	/0	iga - E	Pilot:	9	- 9	%				
	67 kHz:	7	10	%		67 kHz:	7	10	%				
	92 kHz:	0	10	%		92 kHz:	0	10	%				
	57 kHz:	3	0	%		57 kHz:	3	ş 0	%				
	Proponent:	10	0	%		Proponent:	10	· 0	%				
Total	I Deviation:	110	110	%	Tota	al Deviation:	110	110	%				
			Lower 2nd	-			MITRE	Upper 2nd					
	ATTN	D/U	BER	20 Byte	220 Byte	ATTN	D/U	BER	20 Byte	220 Dia		8/6/97	
	(dB)	(dB)	(%)	(%)	(%)	(dB)	(đB)	(%)	(%)	220 Byte (%)	EO&C	۲	
										(70)			
	2.50	-47.35	0.013	0.513	1.875	0.00	-49.85	Unable to ac	hieve OME				
										, 			
	1.50	-48.35	0.959	32.94	66.93				· · ·				
	0.50	-49.35	4.336	86.86	100.0					يەت بىر بە تەتىر			
	0.00	10.05	a a a a										
	0.00	-49.85	7.329	96.65	100.0								
											<u> </u>		
Ľ		· · · · · · · · · · · · · · · · · · ·											
រា		SERVO	T]
1	ATTN	SEIKU ₹D/U	Lower 2nd A				SEIKO	Upper 2nd A	djacent			9/6/07	i
			BER	20 Byte	220 Byte	ATTN	D/U	BER	20 Byte	220 Byte		8/5/97	
1	(dB)	(dB)	(%)	(%)	(%)	(dB)	(dB)		(%)	(%)			
	20.00	-29.85	0.023	0 207	2 101	••••			5 At				
	20.00	-49.05	0.025	0.387	3.191	13.00	-16.85	0.017	0.291	2.128			
	19.00	-30.85	0.250	2 101	10.15								
	19.00	-30.03	0.230	3.191	19.15	12.00	-17.85	0.449	6.452	30.11			
	18.00	-31.85	5 526	22 17									
┣	10,00	-31.03	5.536	33.47	89.01	11.00	-18.85	4.772	33.07	85.71			
	17.00	-32.85	22.49	91 20	100.0	10.00		_					
ŀ	17.00	-34,03	44.47	81.29	100.0	10.00	-19.85	10.72	58.48	98.89			
	16.00	-33.85	55.79	96.74	100.0	0.00	3 0.05	• • • •					
<u>i</u> L	10.00			70.74	100.0	9.00	-20.85	14.24	64.86	98.88			

File Name: HS855G.XLS

G-2 Second Adja Analog -> Ar		7/30/97 SC -> Analog							
Main Channel:	Desired 81	Undesired 81	%	Desired	Undesired		Desired	Undesired	
Pilot:	9	9	%	81 1999 - Maria Maria Maria (1999) 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 19	81 1	%	81	81	%
67 kHz:	10	10	%	10	0	%	9	9	%
92 kHz:	10	10	%	10	7	%	10	0	%
57 kHz:	: 0	0	%	0	3	%	10	0	%
Proponent:	0	0	%	0	10	%	0	10	%
Total Deviation:	110	110	%	110	110	%	0 110	10 110	% %
3 W Input Kay #3	-32.64	-32.67 51.0	dBm dB	Main Chan	nel measureme	ents are Q-Peak de	tected with CCIR		

etected with CCIR and 15 kHz low pass filters. SCA Measurements are RMS detected with 15kHz low pass filter. Best Case Main Channel S/N=50dB.

Clipped Pink Noise on the Undesired main and sub carriers.

At -40 dB D/U S/N=47 dB.

Best Case 67kHz S/N = 46 dB & 92 kHz S/N=52.5dB.

92 kHz signal and noise measuremnents similar.

	G-2.3	G 2 4
94.5 MHz (ngg)	Analog → Analog Reference D/U (dB) S/N (dB) S/N (dB) s/n=45dB 67 kHz 92 kHz	G-2.4 HSSC -> Analog Group C D/U (dB) S/N (dB) S/N (dB) s/n=45dB 67 kHz 92 kHz Group D D/U (dB) S/N (dB) S/N (dB) s/n=45dB 67 kHz 92 kHz
	-40 36 5	<u>-40 36 5 -40 36 5 MITRE</u>
		<u></u>

		Analog -> Analog					HSSC -> Analog								
	93.7 MHz (bwer)	Reference D/U (dB) S/N (dB) S/N (dB) s/n=45dB 67 kHz 92 kHz				D/U (dB) s/n=45dB	Group C S/N (dB) 67 kHz	S/N (dB) 92 kHz		H D/U (dB) s/n=45dB	SSC -> Anale Group D S/N (dB) 67 kHz	og S/N (dB) 92 kHz			
		-40	22	6		-40	32	5		-40	32	5	MITRE:		
Ľ							33	. 5		-40	33	5	SEIKO:		

File Name: HS855G.XLS

Delco 2nd Adj

G-2 Second Ad Analog -> A		7/31/97 SC -> Analog				2		•		ere a construction a l'	1. 1.	
Main Channel:	Desired	Undesired 81	%	:	Desired 81	Undesired 81			Desired	Undesired		
Pilot: 67 kHz: 92 kHz: 57 kHz: Proponent: Total Deviation:	9 10 10 0 0	9 10 10 0 0 110	% % % %	4	9 10 10 0 0 110		% % % % %	a dan 1	81 9 10 10 0 0 110	81 9 0 10 10	% % % %	
3 W Input Kay #3		-32.4 51.0 18.6 G-2.3	dBm dB		SCA IVICASU	irements are		eak detecte		110 filter .	%	
94.5 MHz	Ai D/U (dB) s/n=45dB	nalog -> Anal Reference S/N (dB) 67 kHz	og S/N (dB) 92 kHz] :	H D/U (dB) s/n=45dB	SSC -> Anal Group C S/N (dB) 67 kHz	og S/N (dB) 92 kHz		H D/U (dB) s/n=45dB	SSC -> Analo Group D S/N (dB) 67 kHz	og S/N (dB) 92 kHz	
	-15	46	36		-15 -15	<u>46</u>	3 39 40		-15 -15	46	39	MITRE:
										46	40	SEIKO:

	<u> </u>	nalog -> Ana	log	 H	SSC -> Anal	og				
93.7 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz	D/U (dB) s/n=45dB	Group Ç S/N (dB) 67 kHz	S/N (dB) 92 kHz	H D/U (dB) s/n=45dB	SSC -> Analo Group D S/N (dB) 67 kHz	S/N (dB)	
	-12	46	49	-14	46	49	-15	46	92 kHz 49	MITRE:
l				 -15	46	49	-16	46	49	SEIKO:

File Name: HS855G.XLS

Pioneer 2nd Adj

3 .3

5

Ъ́с

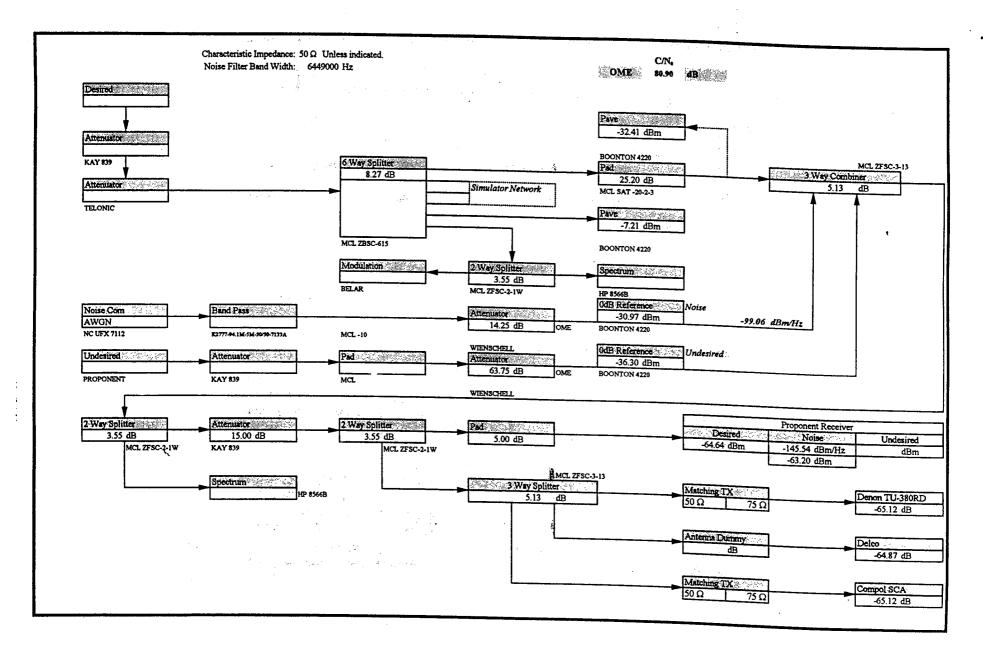
G-2 Second Ad Analog -> A	nalog & HS	7/31/97 SC -> Analog		9								
	Desired	Undesired			Desired	Undesired			Desired	Undesired		
Main Channel:		81	%		81	81	%		81	81	07	
Pilot:		9	%		9	9	- %	:	9	9	%	
67 kHz:	10	10	%		10	0	%		10		%	
92 kHz:		10	%		10	7	%		10	0	%	
57 kHz :		0	%		0	3	%			0	%	
Proponent:	0	0	%		0	10	、 %		0	10	%	
Total Deviation:	110	110	%		110	110	%		0	10	%	
							70		110	110	%	
3 W Input	-32.4	-32.4	dBm		Main Chan	nel measurer	, nents ara O	Deels 1 4				
Kay #3		51.0	dB		SCA Measu	rements are	DMC	Peak detecte	d with CCIR	filter .		
·		18.6			o or r mousu	iements are	RIVIS.					
		G-2.3					÷.					
								G-2.4				
	. A1	ialog -> Anal	og		н	SSC -> Anol	0.0					
94.5 MHz	. Al	nalog -> Anal Reference	og	ו	H	SSC -> Anal	og		н	SSC -> Anal	og	
94.5 MHz		Reference				Group C]	· ·	SSC -> Anal Group D	og	
94.5 MHz	D/U (dB)	Reference S/N (dB)	S/N (dB)		D/U (dB)	Group C S/N (dB)	S/N (dB)		H D/U (dB)	Group D		
94.5 MHz		Reference				Group C			· ·	Group D S/N (dB)	S/N (dB)	
94.5 MHz	D/U (dB)	Reference S/N (dB)	S/N (dB)		D/U (dB) s/n=45dB	Group C S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB)	Group D		
94.5 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB)	Group C S/N (dB)	S/N (dB)		D/U (dB)	Group D S/N (dB) 67 kHz	S/N (dB) 92 kHz	MITDE.
94.5 MHz	D/U (dB)	Reference S/N (dB)	S/N (dB)		D/U (dB) s/n=45dB -33	Group C S/N (dB) 67 kHz 41	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB	Group D S/N (dB)	S/N (dB)	MITRE:
94.5 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB	Group C S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB -33	Group D S/N (dB) 67 kHz 41	S/N (dB) 92 kHz 0	
94.5 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz	S/N (dB) 92 kHz		D/U (dB) s/n=45dB -33	Group C S/N (dB) 67 kHz 41	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB -33	Group D S/N (dB) 67 kHz	S/N (dB) 92 kHz	MITRE: SEIKO:
94.5 MHz	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz 41	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB -33 -33	Group C S/N (dB) 67 kHz 41 41	S/N (dB) 92 kHz 0 0		D/U (dB) s/n=45dB -33	Group D S/N (dB) 67 kHz 41	S/N (dB) 92 kHz 0	
	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz 41 alog -> Anal	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB -33 -33	Group C S/N (dB) 67 kHz 41 41 SSC -> Analo	S/N (dB) 92 kHz 0 0		D/U (dB) s/n=45dB -33 -33	Group D S/N (dB) 67 kHz 41 41	S/N (dB) 92 kHz 0 0	
94.5 MHz 93.7 MHz	D/U (dB) s/n=45dB -33	Reference S/N (dB) 67 kHz 41 alog -> Anal Reference	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB -33 -33 Hi	Group C S/N (dB) 67 kHz 41 41 SSC -> Analo Group C	S/N (dB) 92 kHz 0 0		D/U (dB) s/n=45dB -33 -33	Group D S/N (dB) 67 kHz 41 41 SSC -> Analo	S/N (dB) 92 kHz 0 0	
	D/U (dB) s/n=45dB	Reference S/N (dB) 67 kHz 41 alog -> Anal	S/N (dB) 92 kHz 0		D/U (dB) s/n=45dB -33 -33	Group C S/N (dB) 67 kHz 41 41 SSC -> Analo	S/N (dB) 92 kHz 0 0		D/U (dB) s/n=45dB -33 -33	Group D S/N (dB) 67 kHz 41 41	S/N (dB) 92 kHz 0 0	

<u>s/n=45dB</u> 67 kHz 92 kHz • ` -29 41 12 -29 41 -29 41 9 12 MITRE: -29 41 13 -29 41 13 SEIKO:

Test H (B-1)

Signal Failure with Noise (pilot unlocked)

7.3



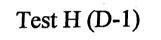
111	litive White Gaussian Noise terization of HS Digital Subcarrier Sign	al Failure		Test Date 9/3/97	Engineer(s):
Basic Te	st Parameters: SIGN Center Frequency:	IAL 94.1 MHz	PROPONENT SPECIFIC		DML COMPOSITE SIGNAL
	RF Level: Main Channel Mod:	-65 dBm CPN		in a la companya da serie da s	5-Band Medium Processed
	SCA Group:	Proponent Only		C	ORBAN #2
	Measurement Duration:	2.5 minutes		CC	OMP OUT 1: Proponent Or OMP OUT 2:
Ana	alog Receivers: Delco RX 7				Main Channel modulation
	Dayton 67kHz SCA Rece	eiver			adjusted for 110%
	Denon RX 2 RBDS Rece	iver W/RDS Check soft	ware utilty		

Noticed increase in HCorrected Packets with CPN modulation. System exhibits inconsistent performance with previous noise tests.

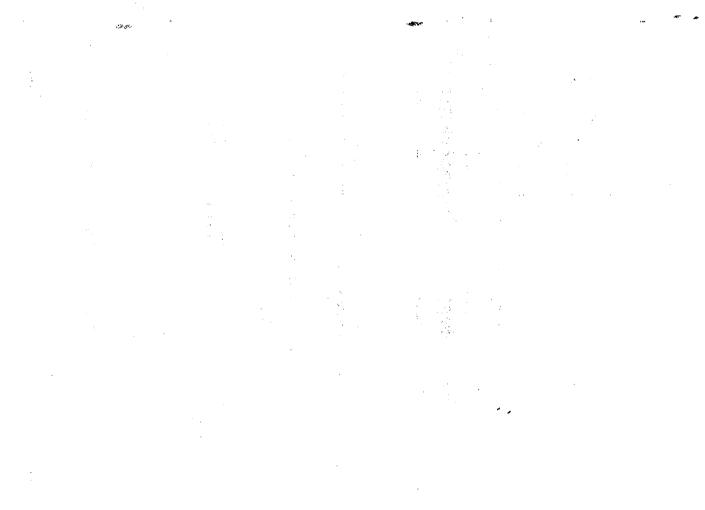
Noise Level		E	ror Level (%)	
C/N,	Attn	BER	20 Byte	220 Byte	
87.65	21.00	0.000	0.000	0.000	Locked to on-air pilot.
86.65	20.00	0.011	0.193	1.064	Locked to on-air pilot.
87.65	21.00	0.000	0.000	0.000	Not locked to on-air pilot.
86.65	20.00	0.017	0.290	2.128	Not locked to on-air pilot.

÷....

. 00



HSSC \rightarrow Host Analog (pilot unlocked)



(H) D-1 HSSC -> Host Analog

Main Channel:				91	%		81	0/		
Pilot:	9 %			9	%	÷		%	81	%
92 kHz:	0 %			0	%		9	%	9	%
57 kHz:	0 %			Õ	%		7	%	0	%
Proponent:	0 %			10	%		3	%	10	%
Total:				110	%		10	%	10	%
	0 dB= 2.06	V		110	the second s		110	%		/0
		T		Deserves		0 dB=	1.86	V		
	Pilot Only		n an an tao a	Proponen + Pilot	ι 		Group C		Group	D
RF Level					SEIKO			SEIVO		
dBm	S/N Units				S/N (dB)			SEIKO		SEIKO
-65	50.4 dB				50.3			S/N (dB)		S/N (dB)
								49.3		49.2
-75	47.6 dB	7			47.6					
			· _ · · · · · · · · · · · · · · · · · ·		1	L		46.7		46.8

Measurements made psophometrically (Q-Peak detected with CCIR weighting and 15 kHz low pass filters).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements made on Left Channel.

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 9/2/97

18.999929 kHz 19.000009 kHz

On Air Seiko Locked

(H) D-1 HSSC -> Host Analog

Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:	91 % 9 % 0 % 0 % 100 % 0 dB= 2.37		9 9 0 0 1 1 1 1	% % %) %	÷.,	81 9 7 3 10 110	% % % %	81 9 0 10 10	% % % %
	0 dB= 2.37	V		· · ·	0 dB=	2.15	V		
	Pilot Only		Propo + P	ilot	4.	Group C		Group	D
RF Level dBm -65 -75	S/N Units 56.2 dB 54.7 dB			SEIKO S/N (dB) 52.4 52.6			SEIKO S/N (dB) 52.0 53.2		SEIKO S/N (dB) 51.3

Measurements made Q-Peak detected with CCIR weighting and 15 kHz low pass filters (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 9/2/97

18.999929 kHz On Air 19.000009 kHz

Seiko Locked

(H) D-1 HSSC -> He	ost Analog	g	•					. • •	. "" " . " . "	••	
Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:	10	91 % 9 % 0 % 0 % 0 %			91 9 0 0 10 110	% % % % %		81 9 7 3 10 110	% % % % %	81 9 0 10 10	% % % %
	0 dB= Pi	757.0 lot Only		n en ange	Proponent + Pilot		0 dB=	682.0	mV		
RF Level						SEIKO		Group C	ST.WO.	Group	D
<u>dBm</u> -65 -75	S/N 49.1 39.4	Units dB dB		9 - 913 2 - 1		<u>\$/N (dB)</u> 49.1			SEIKO S/N (dB) 48.3		SEIKO S/N (dB) 48.3
-13				L		39.4	<u> </u>		38.6		38.6

Measurements made Q-Peak detected with CCIR weighting filter (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation

Unit Not in Screen Box

Clipped Pink Noise on 67 kHz SCA.

Engineer(s): DML

Tests Conducted: 9/2/97

18.999929 kHz 19.000009 kHz

On Air Seiko Locked

(H) D-1 HSSC -> H	ost Analog	and Anna ann an Anna Anna Anna Anna Anna An				
Main Channel: Pilot: 92 kHz: 57 kHz: Proponent: Total:	9 % 0 % 0 % 100 %		91 % 9 % 0 % 0 % 10 % 110 %	 2	81 % 9 % 7 % 3 %	81 % 9 % 0 % 10 % 10 %
	0 dB= 654.0	mV		0 dB=	110 % 588.0 mV	10 /0
RF Level	Pilot Only		Proponent + Pilot		Group C	Group D
dBm	S/N Units			ІКО	SEIKO	
-65	52.6 dB			(dB) 2.2	<u>S/N (dB)</u> 50.5	SEIKO S/N (dB)
-75	43.0 dB		43	3.0		50.3
					41.9	41.9

Measurements made Q-Peak detected with CCIR weighting and 15 kHz low pass filters (psophometric).

0 dB Reference Measurements made with 1 kHz Mod Source on Main Channel L+R.

Measurements on Left Channel

Orban #2 Composite output #1 Set for 91% Main Channel Modulation

Orban #2 Composite output #2 Set for 81% Main Channel Modulation Clipped Pink Noise on 67 kHz SCA.

11 Engineer(s): DML Tests Conducted: 9/2/97

18.999929 kHz 19.000009 kHz

On Air Seiko Locked

.

Ŷ.

4.0 Injection Level Calibration and Analog Subcarrier Deviation Plots

845



87

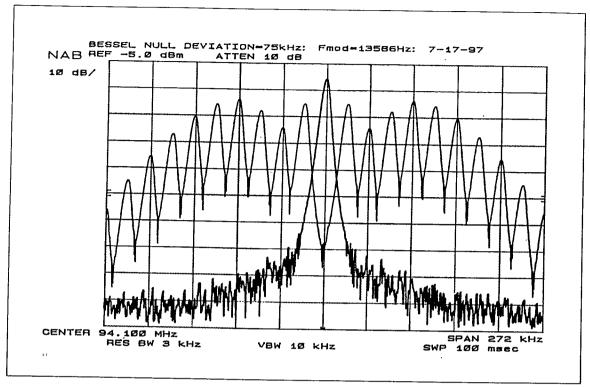


Figure 1: RF Carrier Wave & 2nd Bessel Null

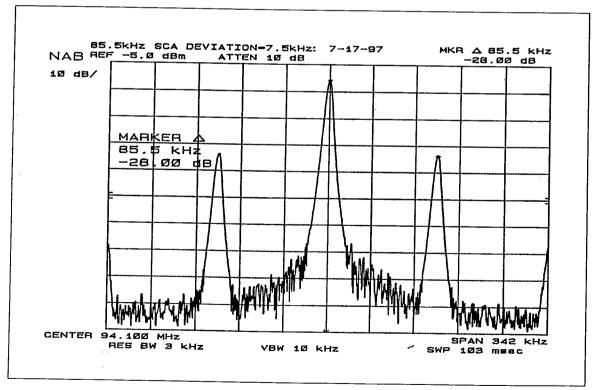


Figure 2: 85.5 kHz Subcarrier at 10 % Injection

· .

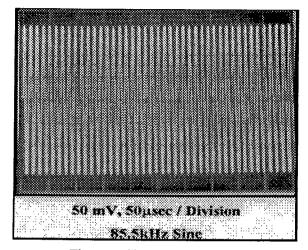


Figure 3: Sine 10 % Injection

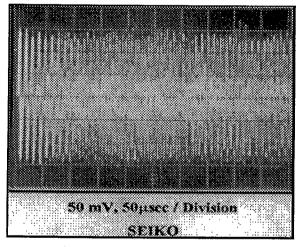


Figure 4: Seiko at 10 % Injection

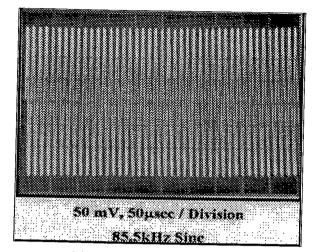


Figure 3: Sine 10 % Injection

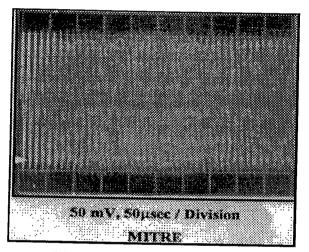


Figure 5: Mitre at 10 % Injection

1

HSSC

Ì

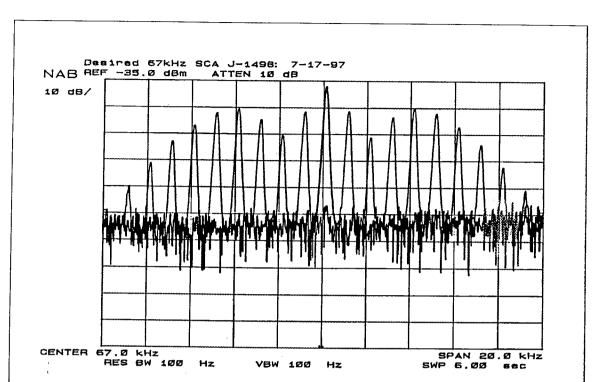


Figure 6: 67 kHz Subcarrier CW and with 5.5 kHz Deviation 1 kHz Sine.

HSSC

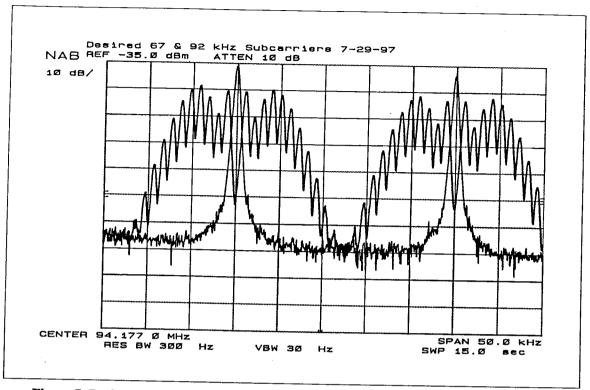


Figure 7: Desired 67 and 92 kHz Subcarriers CW and with 5.5 kHz Deviation 1 kHz Sine.

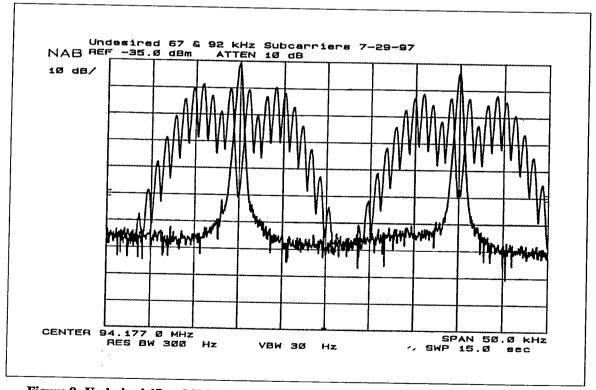


Figure 8: Undesired 67 and 92 kHz Subcarriers CW and with 5.5 kHz Deviation 1 kHz Sine.

HSSC

5.0 67 kHz Subcarrier Receiver Characteristics at Moderate Signal Level (-65 dBm)

604

92

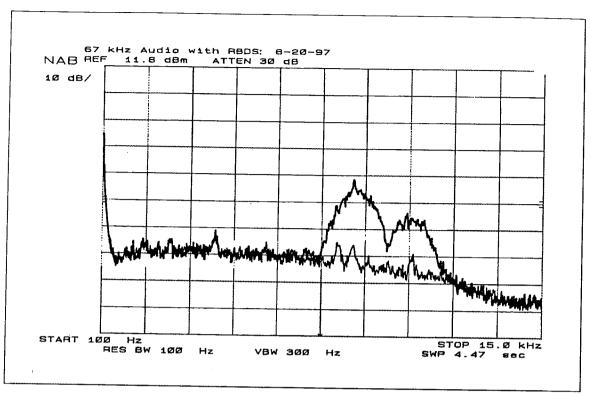


Figure 9: Noise Floor with and without RBDS at 3%

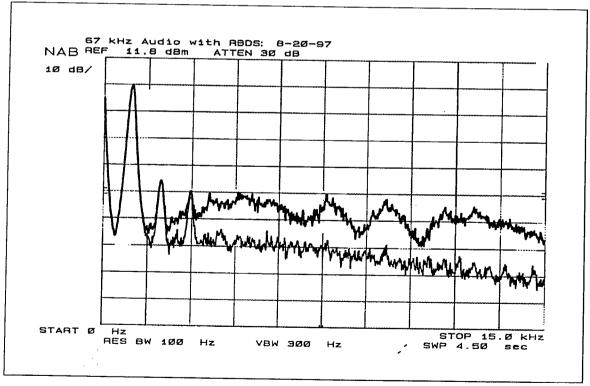


Figure 10: Audio with and without RBDS at 3%

HSSC

j

)

ļ

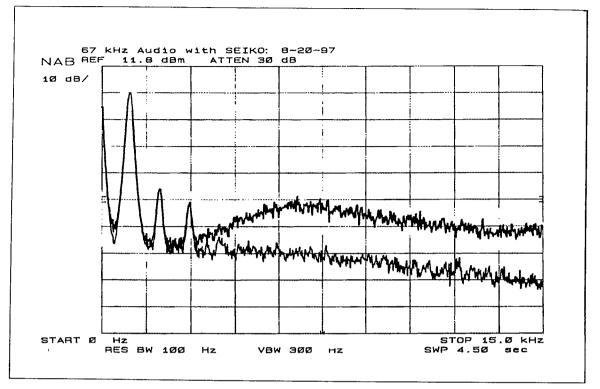
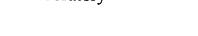


Figure 11: Audio with and without Seiko at 10%

:



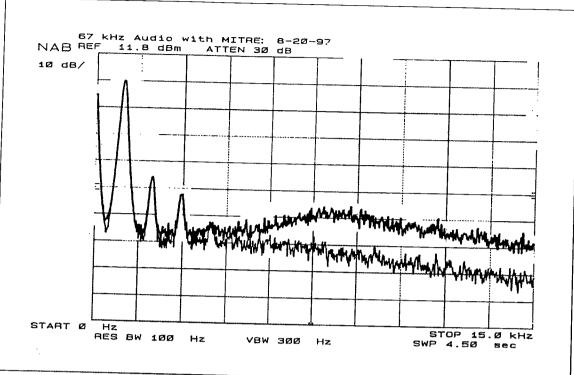


Figure 12: Audio with and without Mitre at 10%

1

HSSC

55 File Name: HS855AM.XLS

1,

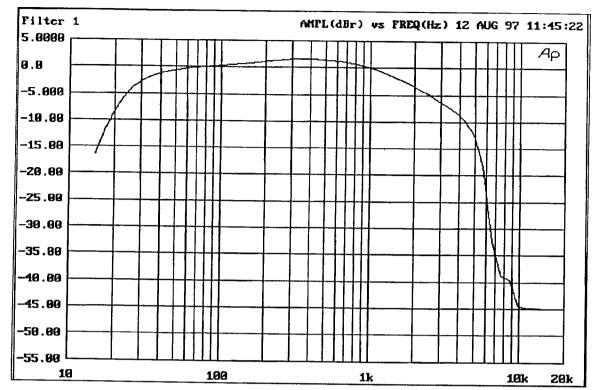


Figure 13: Frequency Response

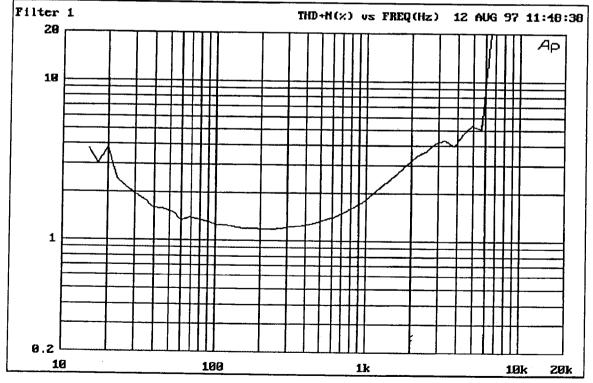


Figure 14: Distortion + Noise

.

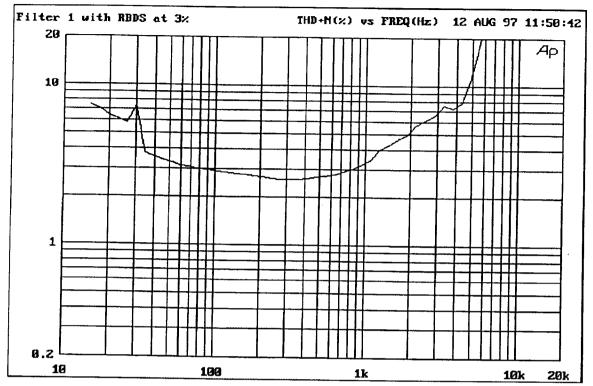


Figure 15: Distortion + Noise with RBDS at 3%

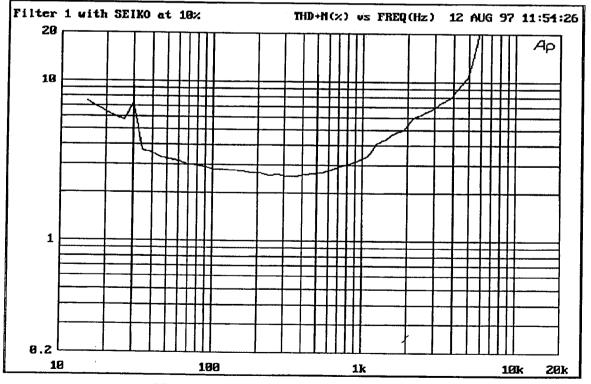


Figure 16: Distortion + Noise with Seiko at 10%

;

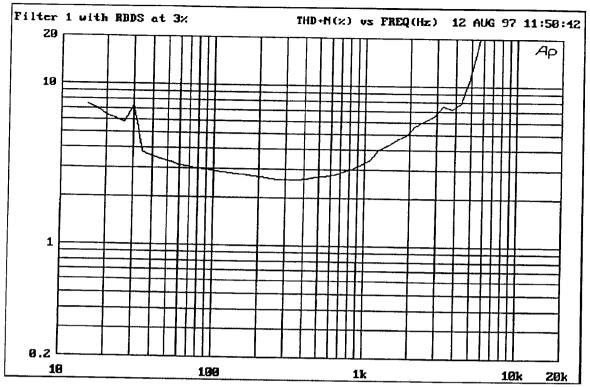


Figure 15: Distortion + Noise with RBDS at 3%

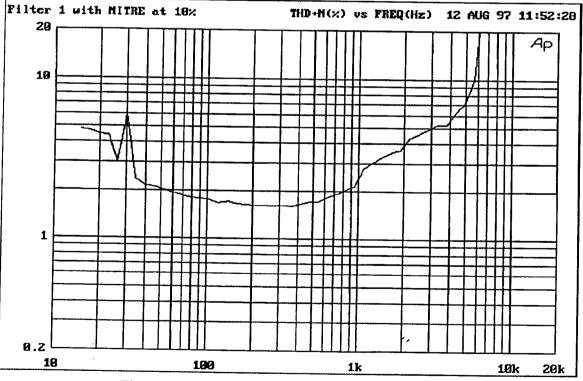


Figure 17: Distortion + Noise with Mitre at 10%

ì

:

HSSC

File Name: HS855AM.XLS

.

6.0 Proponent-only RF, Baseband, and Analog Proof Plots (Seiko)

(00 HSSC

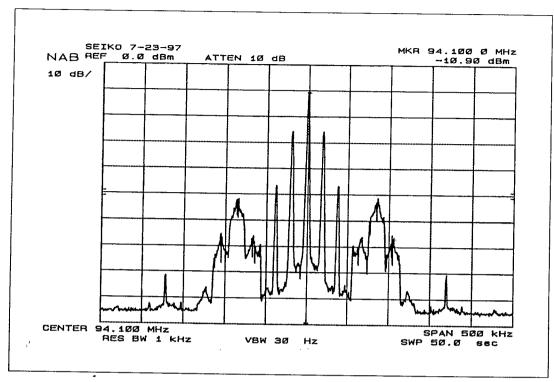


Figure 18: Seiko RF

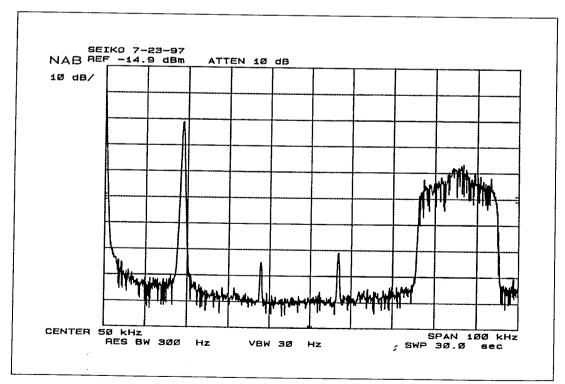
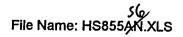


Figure 19: Seiko AFM2 Baseband



HSSC

Seiko Frequency Response AMPL(dBr) & AMPL(dBr) vs FREQ(Hz) 23 JUL 97 11:28:18 5.0000 Aρ 0.0 -5.000 -10.00 -15.00 -28.00 -25.00 -38.00 -35.00 -40.00 -45.00 -50.00 -55.00 20 100 1k 10k 20k

Figure 20: Seiko Frequency Response

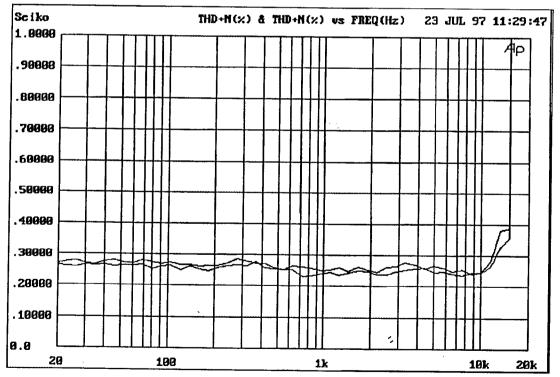


Figure 21: Seiko Distortion + Noise

~

Ĵ



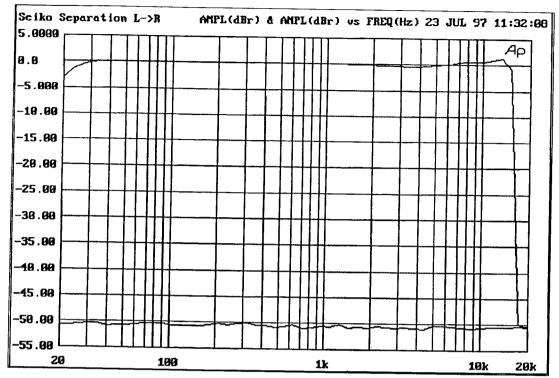


Figure 22: Seiko Separation

•,

• ;

;

7.0 SCA Group C RF, Baseband, and Analog Proof Plots (Seiko)

- 22

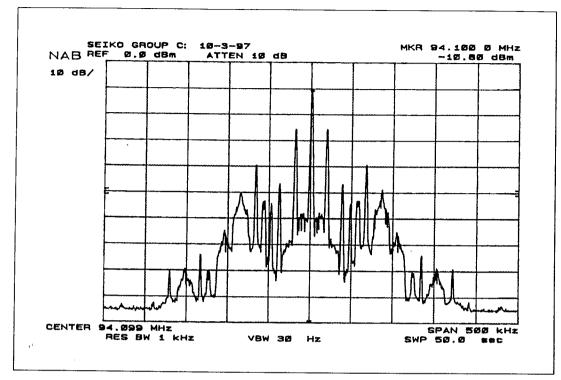
10

103

į.

HSSC

104





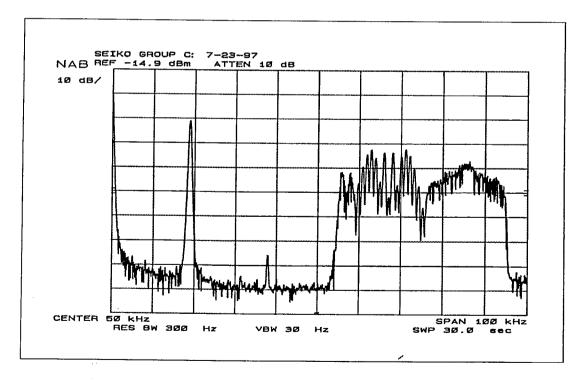


Figure 24: Seiko AFM2 Baseband Group C



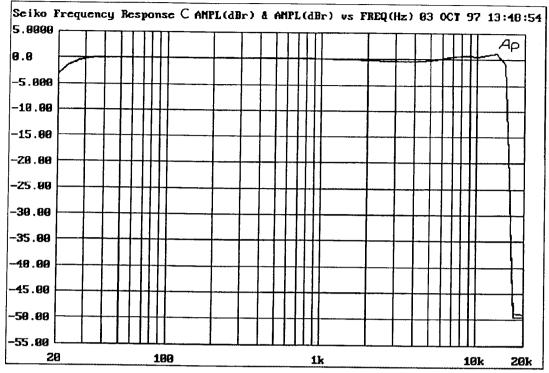


Figure 25: Frequency Response

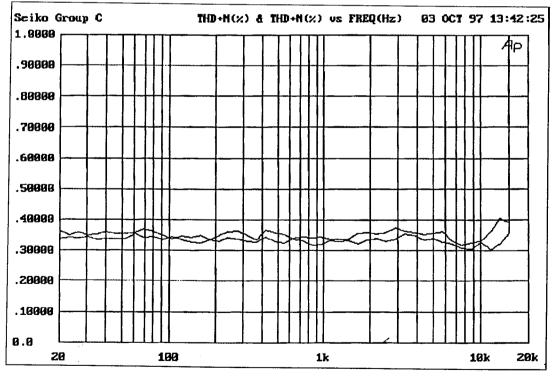
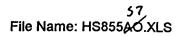


Figure 26: Distortion + Noise



Analog Proof Seiko Group C

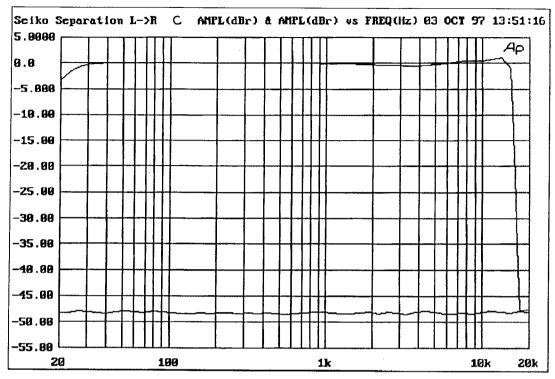


Figure 27: Separation

Analog Proof Seiko Group C

11

8.0 SCA Group D RF, Baseband, and Analog Proof Plots (Seiko)

8 10 *

1

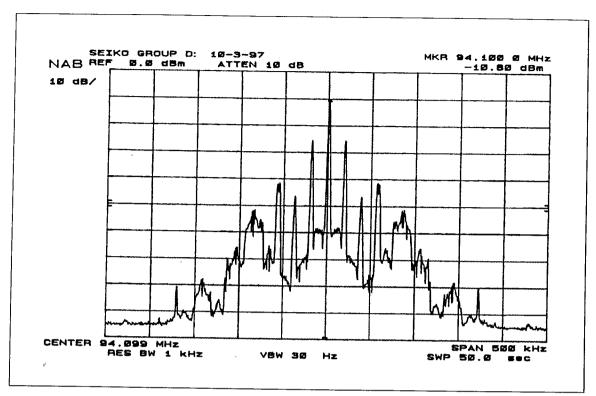


Figure 28: Seiko RF Group D

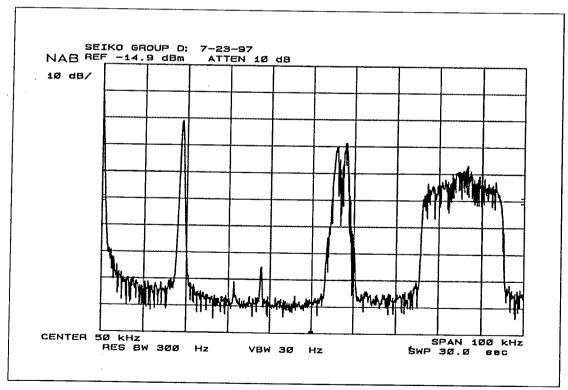


Figure 29: Seiko AFM2 Baseband Group D

Seiko Group D

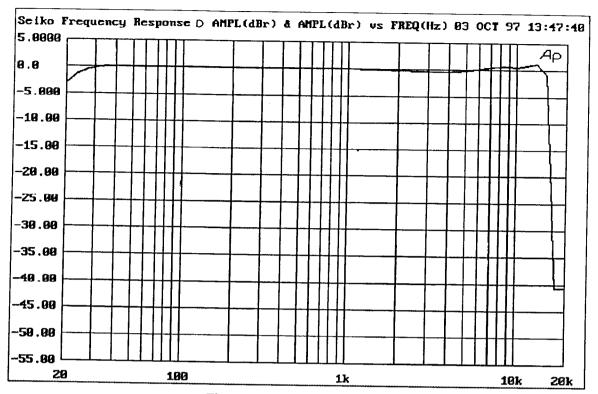


Figure 30: Frequency Response

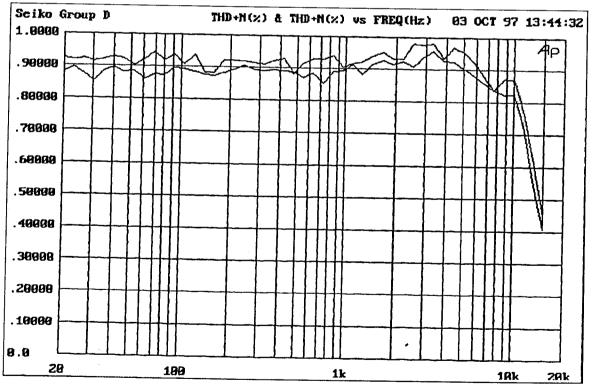


Figure 31: Seiko Distortion + Noise

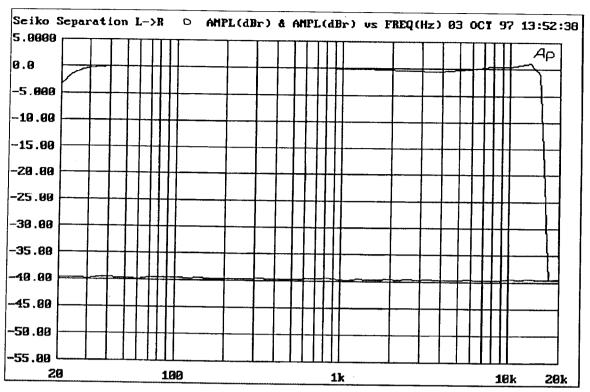


Figure 32: Seiko Separation

Analog Proof Seiko Group D

.

HSSC

.

9.0 Proponent-only RF, Baseband, and Analog Proof Plots (Mitre)

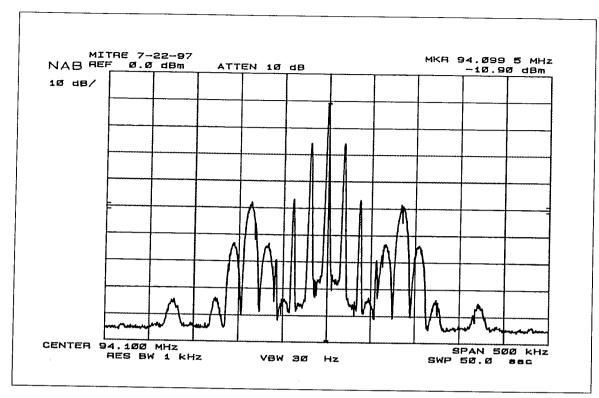


Figure 33: Mitre RF

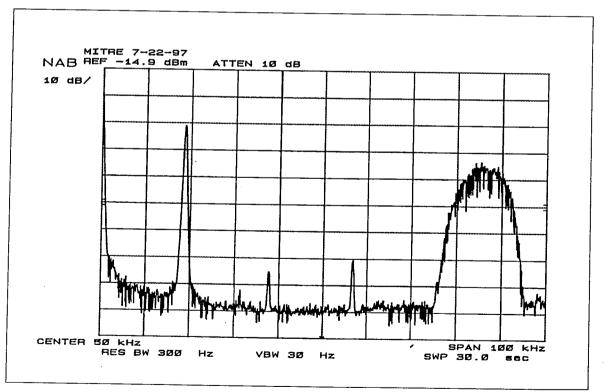


Figure 34: Mitre AFM2 Baseband

59 File Name: HS855AQ:XLS

Proponent Only



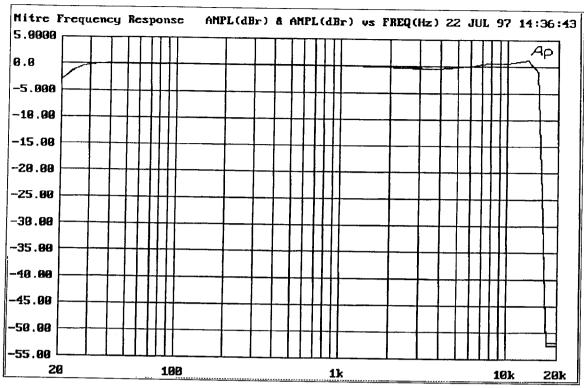


Figure 35: Mitre Frequency Response

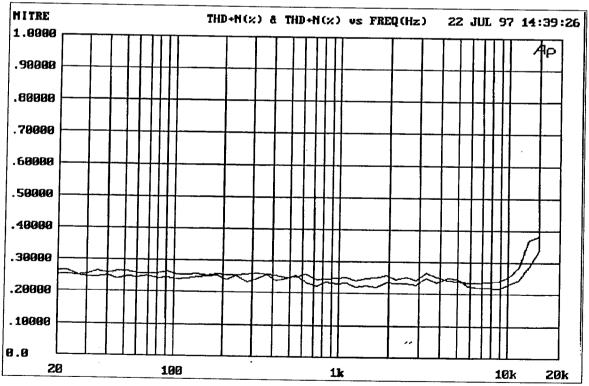


Figure 36: Mitre Distortion + Noise

Analog Proof Mitre Only

Digital Radio Test Laboratory

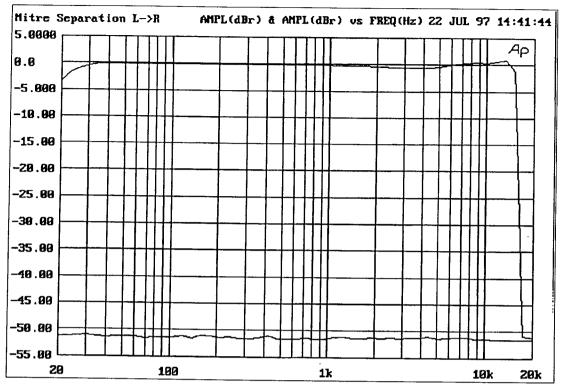


Figure 37: Mitre Separation

Analog Proof Mitre Only

"

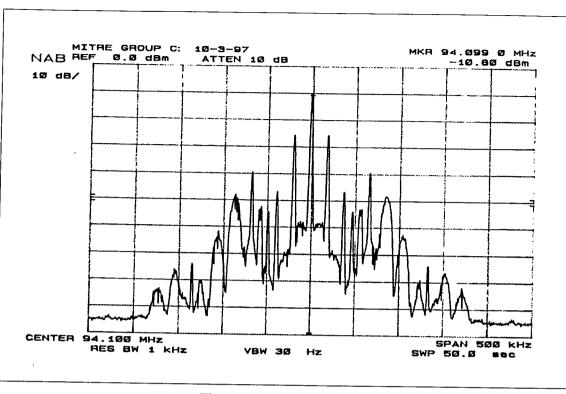
HSSC

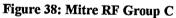
10.0 SCA Group C RF, Baseband, and Analog Proof Plots (Mitre)

Digital Radio Test Laboratory

HSSC

116





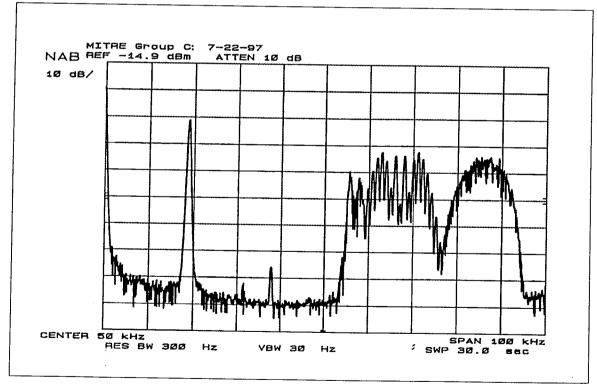


Figure 39: Mitre AFM2 Baseband Group C

Mitre Group C

;

Digital Radio Test Laboratory

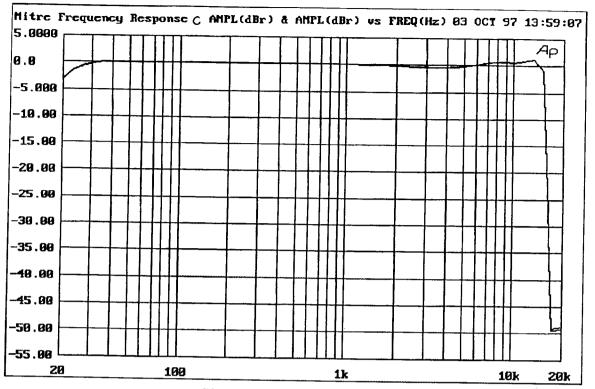


Figure 40: Frequency Response

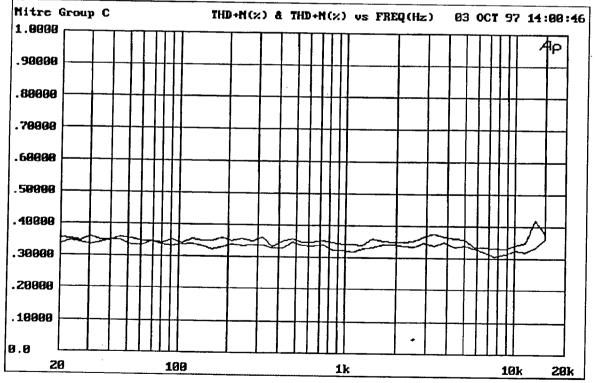


Figure 41: Distortion + Noise

HSSC

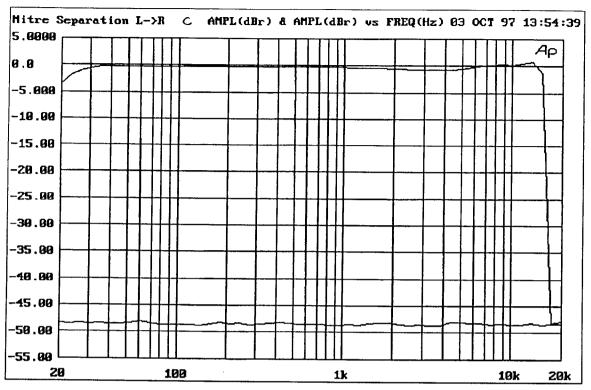


Figure 42: Separation

510 File Name: HS855AR.XLS

Analog Proof Mitre Group C

,

11.0 SCA Group D RF, Baseband, and Analog Proof Plots (Mitre)

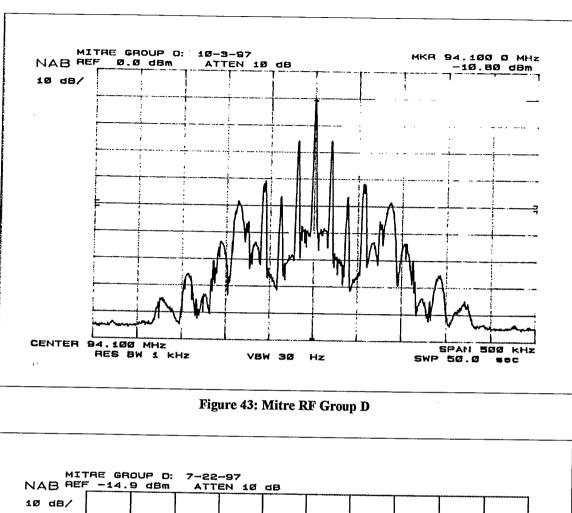
~ 52-

<u>.</u>

1

N7.)

HSSC



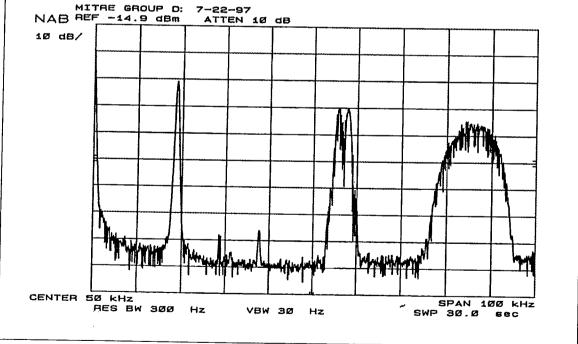


Figure 44: Mitre AFM2 Baseband Group D

Mitre Group D

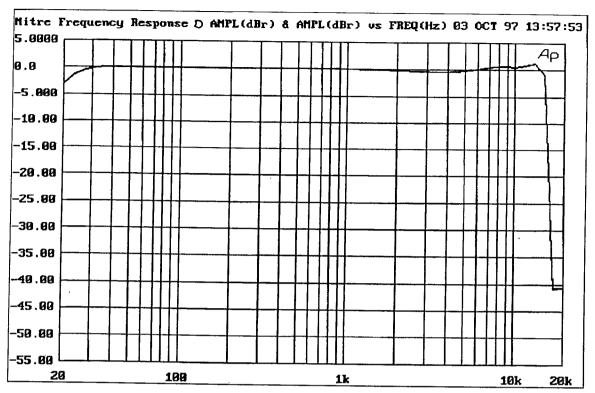


Figure 45: Frequency Response

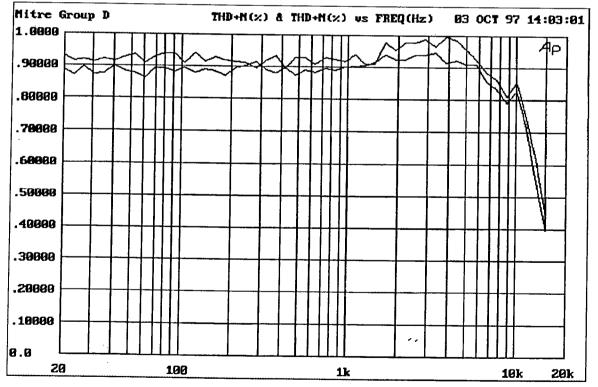


Figure 46: Distortion + Noise

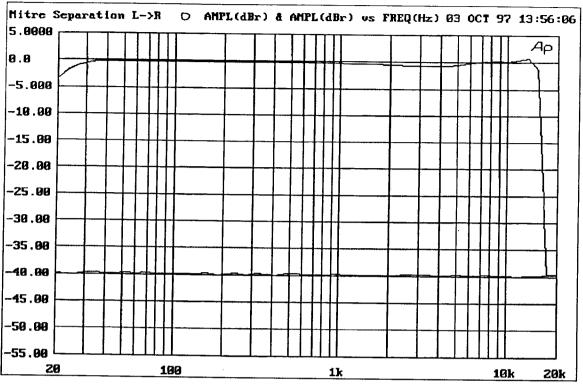


Figure 47: Separation

HSSC

122

Page 3 of 3

Analog Proof Mitre Group D

,

Appendix A Test B-3 Data with Simulator Offsets

÷.

123

Digital Radio Test Laboratory

B-3 Multipath7/25/97Characterization of HS Digital Subcarrier Signal FailureBasic Test Parameters:SIGNAL

· . .

PROPONENT SPECIFIC

475

2

One Path Zero Phase Reference: -65dBm Main Channel Mod: CPN SCA Group: C Analog SCA modulated with ABBA. Error Measurement Duration: 2.5 minutes

	Noise	Noise Level		Error Level (%)		
	C/N.	Attn	BER	20 Byte	220 Byte	
Urban Slow	129.48	63.75	0.000	0.000	0.000	
	86.73	21.00	0.000	0.000	0.000	
Offset	85.73	20.00	0.014	0.572	1.867	
-2.45 dB	84.73	19.00	0.182	6.727	14.80	
	83.73	18.00	0.447	15.86	27.87	
	82.73	17.00	1.242	30.68	40.82	
	81.73	16.00	2.295	40.73	51.73	
Urban Fast	129.48	63.75	0.000	0.000	0.000	
	84.73	19.00	0.000	0.000	0.000	
Offset	83.73	18.00	0.010	0.333	0.941	
-2.45 dB	82.73	17.00	0.179	6.227	14.50	
	81.73	16.00	1.058	30.37	50.75	
	80.73	15.00	3.647	73.72	95.25	
	79.73	14.00	8.820	96.41	100.0	
Rural Fast	126.40	63.75	0.000	0.000	0.000	
	84.65	22.00	0.000	0.000	0.000	
Offset	83.65	21.00	0.009	0.304	0.933	
-5.53 dB	82.65	20.00	0.491	17.24	38.67	
	81.65	19.00	2.850	69.95	96.67	
	80.65	18.00	6.976	95.43	100.0	
Obstructed	131.93	63.75	49.83	100.0	100.0	

COMPOSITE SIGNAL

ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% 5 Band Medium Fast Processing

Digital Radio Test Laboratory

B-3 Multipath

Characterization of HS Digital Subcarrier Signal Failure Basic Test Parameters: SIGNAL

PROPONENT SPECIFIC

4-5

One Path Zero Phase Reference: -65dBm Main Channel Mod: CPN SCA Group: C Analog SCA modulated with ABBA. Error Measurement Duration: 2.5 minutes

		Noise Level		E	(%)	
		C/N _o	Attn	BER	20 Byte	220 Byte
Urban Slow		129.48	63.75	4.771	10.91	24.44
Offset		86.73	21.00	15.87	35.84	52.33
-2.45 dB		85.73	20.00	19.35	41.88	57.14
		84.73	19.00	21.25	43.72	63.10
		83.73	18.00	25.38	48.52	65.00
Urban Fast		129.48	63.75	39.41	54.10	96.30
Offset	Υ.	84.73	19.00	70.51	86.04	100.0
-2.45 dB						
Rural Fast		126.40	63.75	41.55	60.02	96.15
Offset		84.65	22.00	75.65	90.91	100.0
-5.53 dB						
Obstructed		127.93	63.75	99.96	100.0	100.0

COMPOSITE SIGNAL

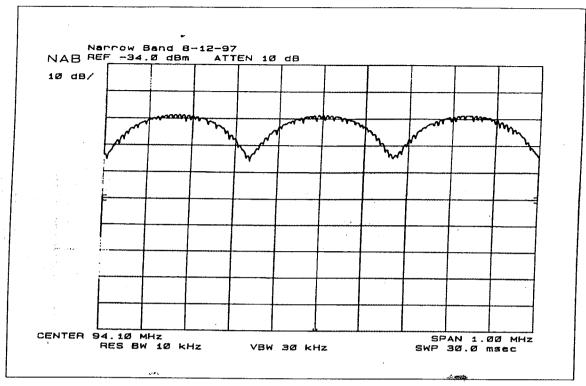
ORBAN #2 COMP OUT 1: Proponent Only COMP OUT 2: Prop + SCA Main Channel modulation adjusted for 110% 5 Band Medium Fast Processing

Appendix B RF Distortion Scenario Frequency Response

, i

Digital Radio Test Laboratory







....

\$

NRSC

T

.

Digital Radio Test Laboratory

HSSC

.128.

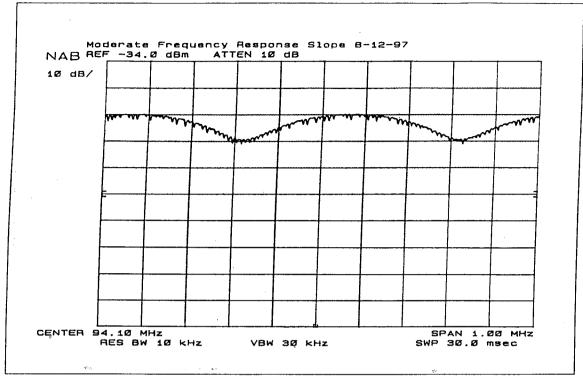


Figure 62: Moderate Frequency Response Slope

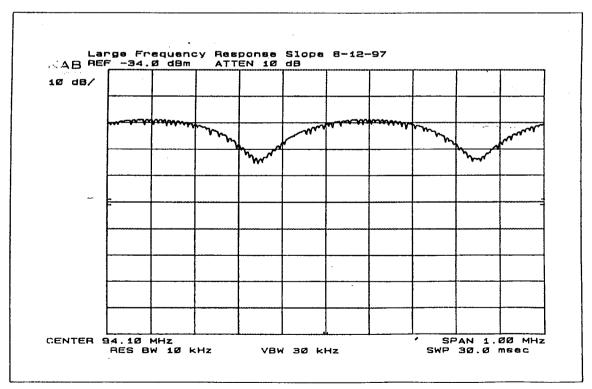


Figure 63: Large Frequency Response Slope

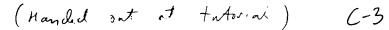
NRSC

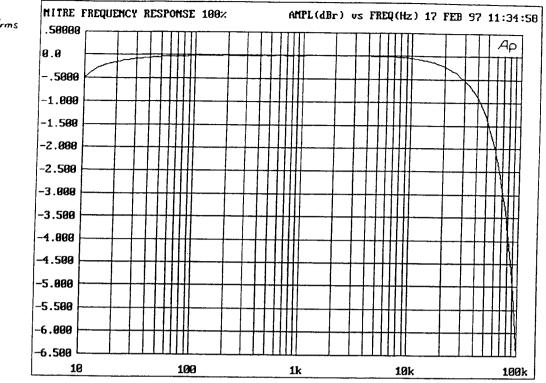
(Attachment 3)

Appendix C Proponent Receiver Characterization Data

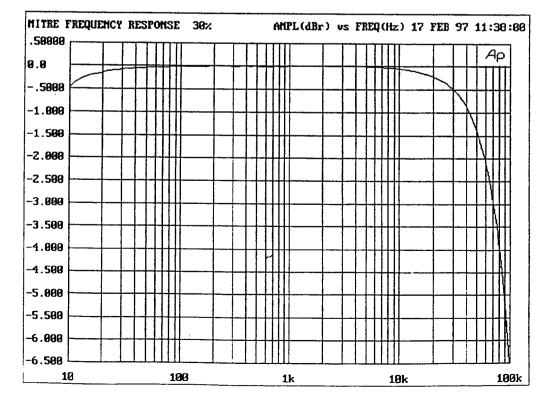
C-2

Proponent - Mitre



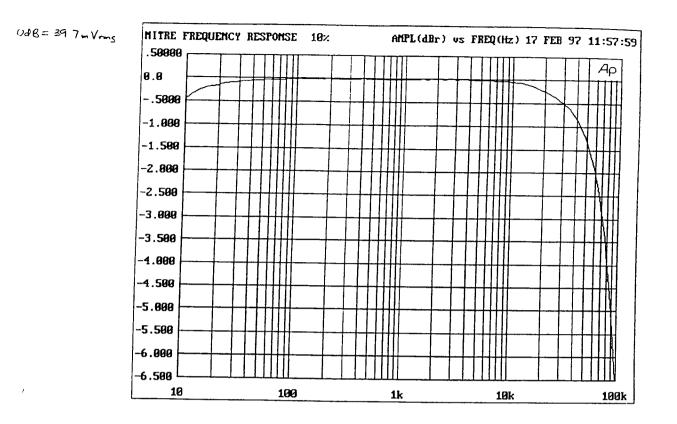


OdB= 119 m Vrms

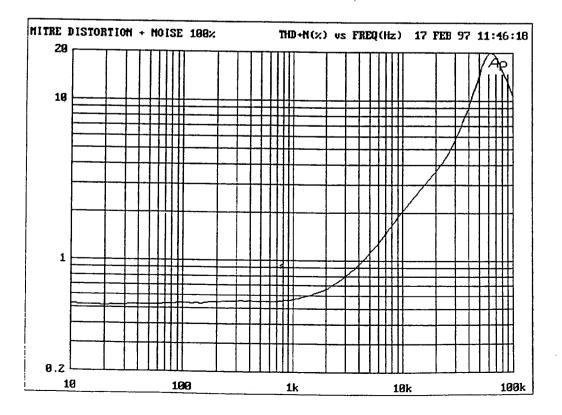


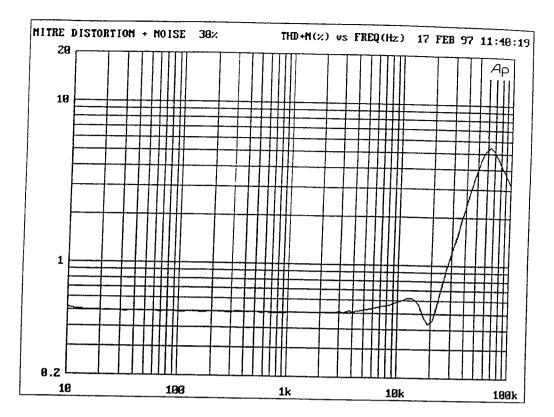
odB= 403m Vrms

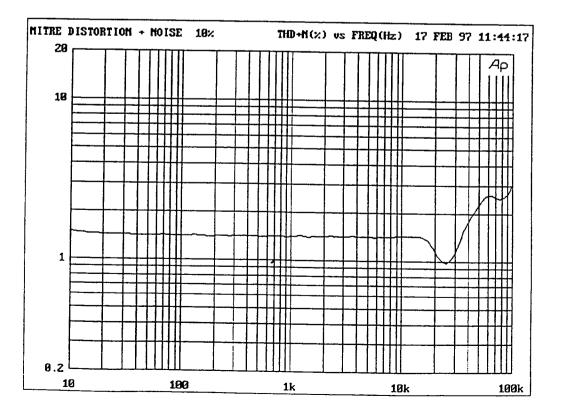
C-4

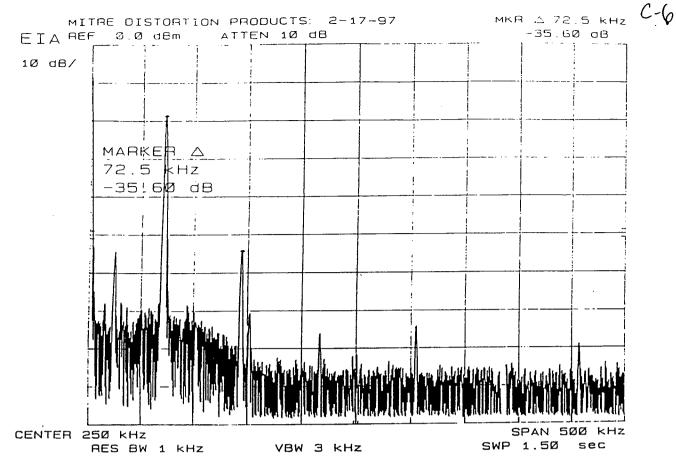


ι.

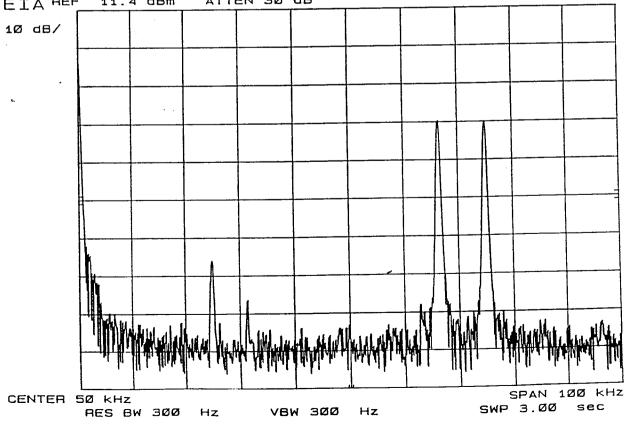








MITRE DISTORTION PRODUCTS 3-27-97 EIA REF_ 11.4 dBm ATTEN 30 dB



Digital Radio Test Laboratory

ASSC Proponent Re	ceiver Characteria	ation	ntal Radio Test La	looratory			
Date: 2/17/07					RF (dBm)	Signal (dB)	Noise (dB)
Date: 2/17/97					-50	0.00	-71.50
By: DML					-55	0.00	-71.50
					-60	0.00	-71.20
D / 101 .					-65	0.00	-70.00
Desired Signal:	94.10 MHz	Modulation:	1 kHz		-70	0.00	-67.50
		Injection:	100 %		-75	0.00	-63.60
		0dB:	403 mV		-80	0.00	-59.20
					-85	0.00	-54.50
Measurement: L	Measurement: Level; RMS, with 15kHz Low Pass Filter				-90	0.00	-49.50
	Results: S/N vs RF Level				-95	0.00	-44.80
Results: S/					-100	-0.03	-40.00
				Limiting	-105	-0.13	-35.50
				Threshold	-110	-2.20	-24.00
					-115	-8.00	-18.60
Radio Type: Alpine 7502					-120	-12.00	-18.00
					-125	-15.00	-18.00
					-130	-16.00	-18.00

File Name: MITRE_RX.XLS

;

SN vs RF Level

4

Page 1 of 2

5.00 i ł 0.00 -5.00 ÷ -10.00 ł į -15.00 -20.00 1 Ì ÷ ÷ -25.00 (ap)-30.00 NS-35.00 NS-40.00 i i ł i ł ł -45.00 -50.00 : -55.00 : ; -60.00 į ł -65.00 ;

Digital Radio Test Laboratory

File Name: MITRE_RX XLS

-125

-120

-115

-110

-105

-70.00

-75.00

-130

SN vs RF Level

8

RF Level (dBm)

80

-75

6-1

-65

Ş

8

-95

:

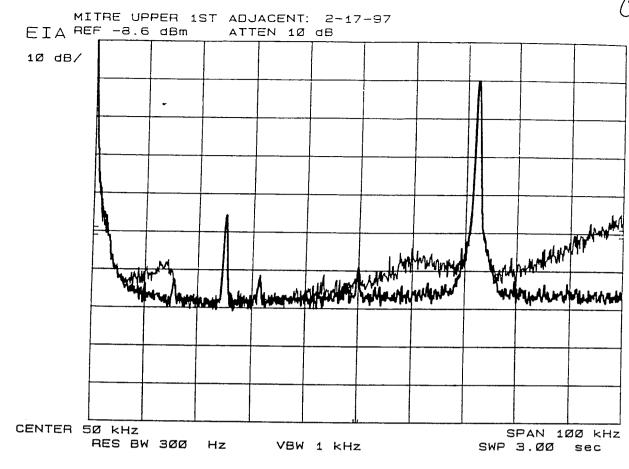
-100

Page 2 of 2

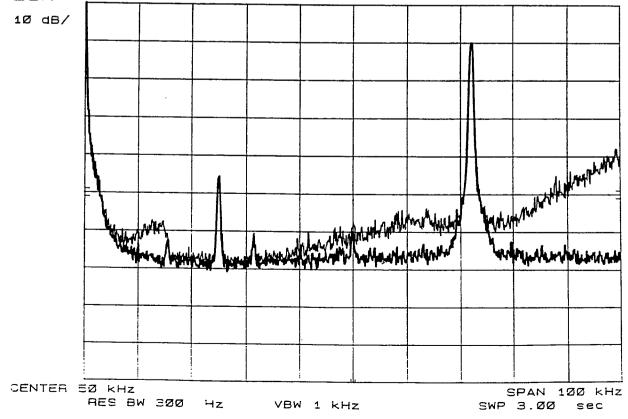
-50

-55

C-7

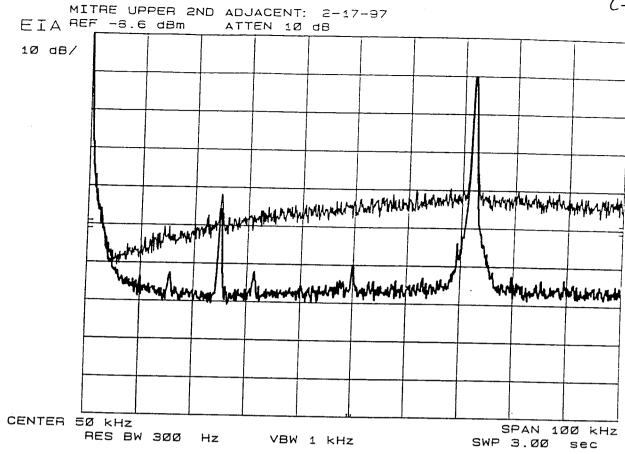


MITRE LOWER 1ST ADJACENT: 2-17-97 EIA REF -8.6 dBm ATTEN 10 dB



C-8

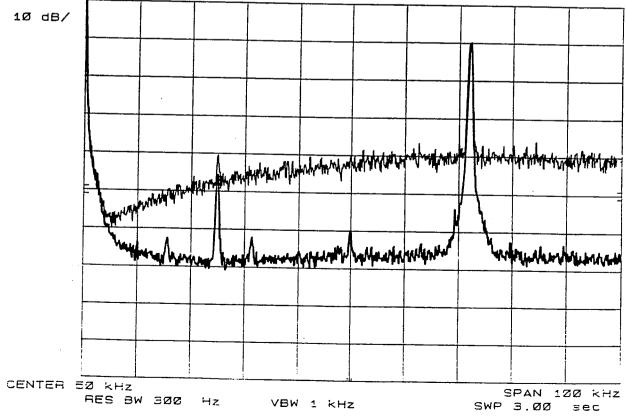
.



MITRE LOWER 2ND ADJACENT: 2-17-97 EIA REF -8.6 dBm ATTEN 10 dB

·--

-

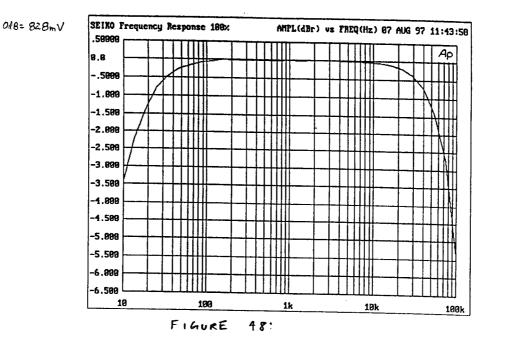


C-9

. ...

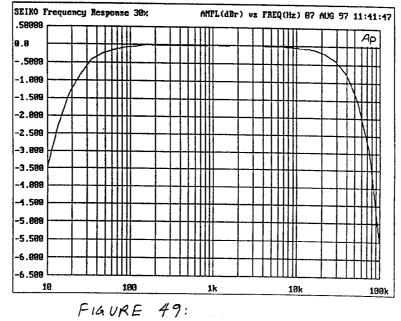
Proponent - Seiko

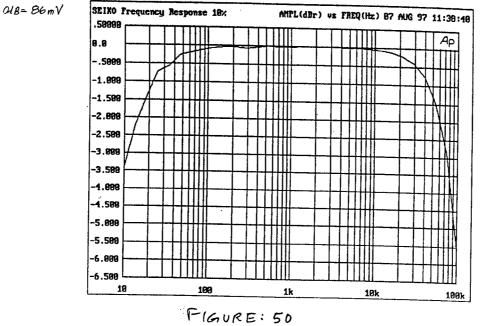
~

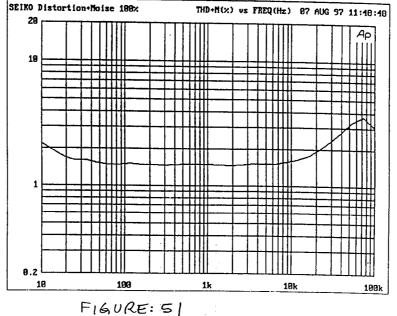


018=257mV

.

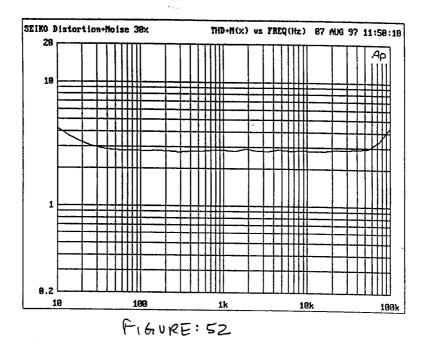






`

C-17



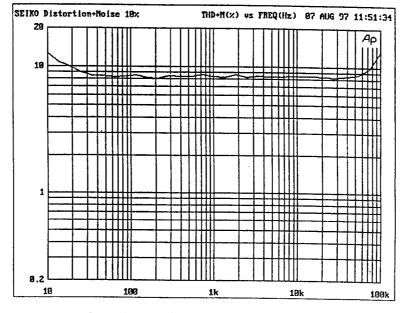
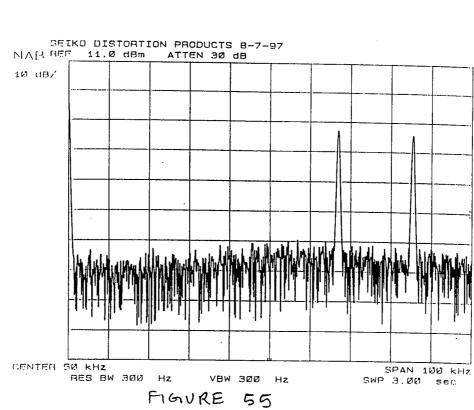


FIGURE: 53

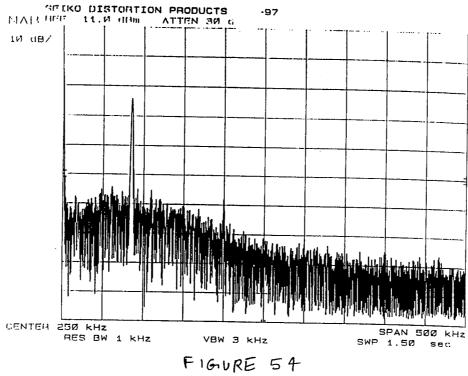
١.

.

۲



1



C-14

· ,

materia.		٠.	•	1			
Proponent	Receiver Characte	-					
Date: 8/7/97					RF (dBm)	Signel (dB)	Noise (dB)
Engr: DML					-50	0.00	-48.20
•					-55	0.00	-48.20
					-60	0.00	-48.20
Desired Signal:	94.10 MHz	Modulation:			-65	-0.01	-48.20
	21.10 Mills		l kHz		-70	-0.03	-48.20
		Deviation:	100 %		-75	-0.03	-48.00
		0dB;	828 mV		-80	-0.04	-47.30
Measurement: Level, RMS with 15kHz Low Pass Filter				-85	-0.07	-45.60	
enterenter enterenter et	ever, rovio with 15	KHZ LOW Pass Filter			-90	-0.09	-42.60
Resulte: S	/N vs RF Level				-95	-0.14	-38.10
incluits, 3	IT VS ICT LEVEL			"Limiting	A 31002	0.35	23.00
				Threshold	Rad 1051		\$ 8.00
					-110	-3.40	-3.90
Pedia Tunes D	C Expansion Card				-115	-2.90	-2.40
india Type: L	C Expansion Card				-120	-2.50	-1.90
					-125	-2.30	-1.70
					-130	-2.30	-1.70

H\$SC

Page 1 of 2

HSSC

File Name: SEIKO_RX.XLS

NRSC

5.00 0.00 -5.00

-10,00

-15.00 -20.00 -25.00

(f)-30.00 (f)-35.00 (f)-35.00 (f)-35.00 (f)-35.00 (f)-35.00

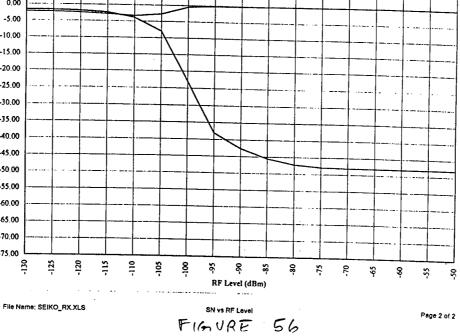
-45.00 -50.00

-55.00 -60.00 -65.00 -70.00 -75.00 -130

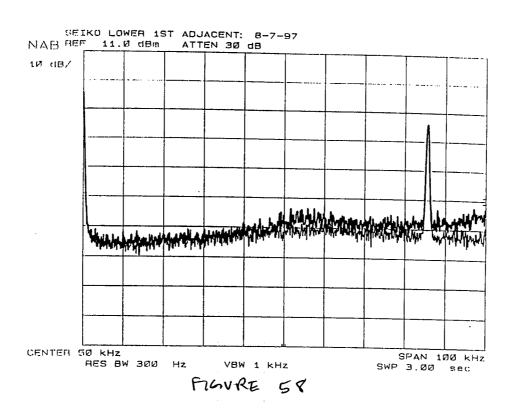
ð

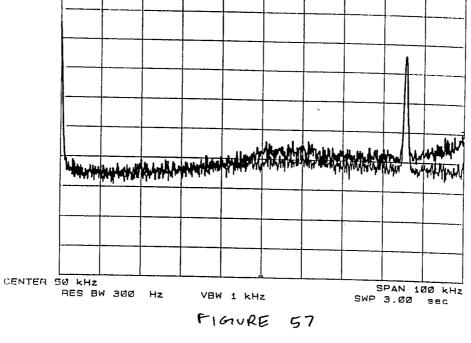
SN vs RF Level

Digital Radio Test Laboratory



C-15





ۍ ب

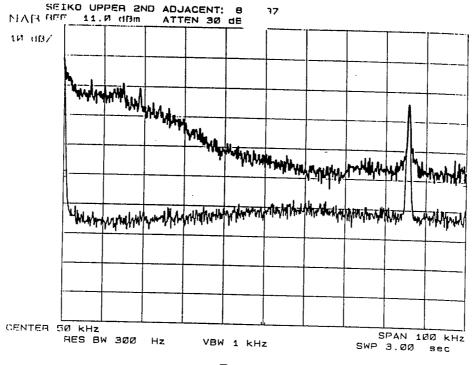
NALS HET 11.9 dBm ATTEN 30 d

ти чви

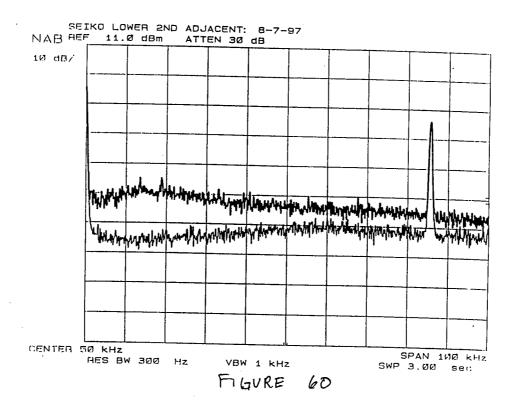
1

C-(6

.







*

C-(7

,

NRSC-R35

NRSC Document Improvement Proposal

If in the review or use of this document a potential change appears needed for safety, health or technical reasons, please fill in the appropriate information below and email, mail or fax to:

National Radio Systems Committee c/o Consumer Electronics Association Technology & Standards Department 1919 S. Eads St. Arlington, VA 22202 FAX: 703-907-4190 Email: standards@ce.org

DOCUMENT NO.	DOCUMENT TITLE:				
SUBMITTER'S NAME:		Tel:			
Company:		FAX:			
		Email:			
Address:					
URGENCY OF CHANGE:					
Immediate		At next revision			
PROBLEM AREA (ATTACH ADDI	TIONAL SHEETS IF NECESSARY)	:			
a. Clause Number and/or	Drawing:				
b. Recommended Chang	es:				
c. Reason/Rationale for Recommendation:					
ADDITIONAL REMARKS:					
SIGNATURE:		DATE:			
	EOD NDSC				
Date forwarded to N Responsible Co- Co- Date forwarded to co-	ommittee:				



