

A

**SUMMARY OF CORPORATION FOR PUBLIC BROADCASTING  
AUTHORIZATIONS AND APPROPRIATIONS**

Fiscal Years 1969-2001 (In Millions of Dollars)

Fiscal Year	CPB Authorization	CPB Appropriation
1969	9	5
1970	25	15
1971	35	23
1972	35	35
1973	45	35
1974	55	47.7
1975	65	62
1976	110	96
1977	103	103
1978	121	119.2
1979	140	120.2
1980	160	152
1981	180	162
1982	200	172
1983	220	137
1984	145	137.5
1985	153	150.5
1986	162	159.5
1987	200.5	200
1988	214	214
1989	238	228
1990	254	229.4
1991	245	242.1
1992	265	251
1993	285	253.35
1994	310	275
1995	375	285.64
1996	425	275
1997		260
1998		250
1999		250
2000		300
2001		340
Total	ttach	5585.09

B

**FUNDING HISTORY OF  
PUBLIC TELECOMMUNICATIONS FACILITIES PROGRAM (PTFP)  
(in millions of dollars)**

Fiscal Year	Authorization	Appropriation	Funds requested	Number of requests	Number of	
					Radio Awards	Radio Amount
1963-1967		\$32	\$61	235		
1968		---	---	---		
1969	\$12.50	3.2	8	51	11	0.4
1970	15	5.4	5	21	10	0.55
1971	15	11	19.7	96	27	1.67
1972	15	13	11	76	26	1.52
1973	15	13	17.2	84	30	1.9
1974	25	15.7	26.2	121	27	1.72
1975	30	12	18.1	79	21	1.16
1976	30	12.9	18.1	121	30	2.24
1977	30	14	40.1	213	50	1.36
1978	30	18	55.3	254	59	3.88
1979	40	18	84.6	454	51	4.11
1980	40	23.7	79.9	462	50	4.48
1981	40	21.7	103.9	558	59	4.18
1982	20	18	89.1	256	48	3.92
1983	15	15	66.2	327	45	4.14
1984	12	11.9	71.9	324	31	2.1
1985	---	24	124	424	68	4.76
1986	24	22.9	91.3	328	48	3.19
1987	28	20.5	88.7	337	46	3.19
1988	32	21.3	68	304	50	2.91
1989	36	20	58	283	52	4.94
1990	39	20	72.3	297	47	3.45
1991	42	21.8	63.5	277	55	3.8
1992	42	19.9	76	316	54	4.3
1993	42	21.3	77.7	305	42	5.7
1994	42	24	96.9	325	49	3.2
1995		29	75	296	59	5.48
1996		15.5	54.9	251	41	2.7
1997		15.25	49.2	220	37	2.87
1998		21	65.9	240	47	2.5
1999		21	N/A	N/A	N/A	N/A
Total		\$711.50	\$576	\$1,837	7935	1270
						\$92.32

Source: National Telecommunications and Information Administration, Department of Commerce

**c**

The FM Receiver Interference Tests, Laboratory Test Report  
is contained in a separate loose-leaf notebook, labeled Attachment C.

**D**

**ENGINEERING STATEMENT RE;  
MEASURED FM RADIO RECEIVER  
AUDIO PERFORMANCE  
FCC MM DOCKET 99-25  
NATIONAL PUBLIC RADIO  
WASHINGTON, D.C.**

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**FIGURES**

CO-CHANNEL INTERFERENCE	FIG. 1
1 <sup>ST</sup> ADJACENT CHANNEL UPPER	FIG. 2A
1 <sup>ST</sup> ADJACENT CHANNEL LOWER	FIG. 2B
2 <sup>ND</sup> ADJACENT CHANNEL UPPER	FIG. 3A
2 <sup>ND</sup> ADJACENT CHANNEL LOWER	FIG. 3B
3 <sup>RD</sup> ADJACENT CHANNEL UPPER	FIG. 4A
3 <sup>RD</sup> ADJACENT CHANNEL LOWER	FIG. 4B

Prepared by  
Lohnes and Culver              Washington, D.C.  
July, 1999

**ENGINEERING STATEMENT RE;  
MEASURED FM RADIO RECEIVER  
AUDIO PERFORMANCE  
FCC MM DOCKET 99-25  
NATIONAL PUBLIC RADIO  
WASHINGTON, D.C.**

**INTRODUCTION**

This Engineering Statement has been prepared on behalf of National Public Radio (NPR) Washington, D.C. It supplies information relating to the analysis of the measured audio performance of modern FM Radio receivers, recently conducted by the Consumer Electronics Manufacturers Association (CEMA). It presents observations of the test data and the application of that measured data in FCC Mass Media Docket No. 99-25. The information contained herein is presented in relation to the current FCC Rules, policies and the proposals in the above referenced Docket. The information and exhibits are based on measurements made by CEMA, on behalf of NPR and presented in separate parts of the full NPR and CEMA reports in this Docket, of which this statement is a part.

**MEASURED FM RECEIVER PERFORMANCE**

A representative sample of FM radio receivers has been tested as explained elsewhere in the NPR and CEMA reports. In summary, the sample consisted of receivers which were generally characterized as follows; five automobile, six personal portable and five home Hi-Fi fixed location receivers. Receiver sales data for recent years, contained elsewhere in the reports, indicates that more than 80 Million FM receivers which fit into these broad categories are sold each year. The sample of test receivers, by these broad categories and by the general receiver design, are thought to represent a significant, if not nearly complete, sample of the FM receivers sold each year.

The receiver samples were carefully tested to determine their individual ultimate performance specifications, to reveal any defective samples and to establish a best case performance baseline. The receivers were then subjected to various tests under simulated use with varying desired and interfering signals presented to each. The test methodology

and assumptions are explained in detail elsewhere in the full CEMA report. By reviewing the test plan and results, the author of this statement is confident that contemporary and credible test methods were employed and that the test provides useful information in the pending Mass Media Rule Making.

The FCC Notice of Proposed Rule Making in the above referenced Docket specifically focused on the performance of receivers in the presence of various potential interfering signals on several nearby frequencies; co-channel, first adjacent, second adjacent and third adjacent. Various desired to interfering signal strengths were considered in these tests. Receiver performance was measured at two target conditions. First, at a desired audio performance level, with the interfering RF level as a variable. Next, the receiver measurements were repeated at various fixed interfering RF signal levels with audio performance as a variable.

## **GRAPHICAL PRESENTATION OF DATA**

A graphical analysis and presentation is made in this report to illustrate the general trend and range of performance of modern FM Radio receivers in the presence of interfering signals. The following graphical information was extracted directly from the detailed CEMA test report. All of the graphs have been confined to the tests conducted with a desired signal power of -50dBm input to the receiver under test. Other tests were conducted at lower input levels but on many of the receivers performance was so bad that meaningful performance measurements could not be made. Test results are plotted with Audio WQP (Weighted Quasi-Peak) SNR (Signal to Noise Ratio) on one axis and the RF desired to undesired (d/u) ratio in dB on the other axis. A negative dB d/u ratio indicates that the desired signal is less than the interfering undesired signal, or conversely that interference exceeds the desired signal.

### **CO-CHANNEL MEASUREMENT**

The graph attached as Figure 1 illustrates all of the data measured for the on frequency (co-channel) interfering signal condition. Three data sets were generated, as explained above, one for the fixed audio performance condition and two for the fixed RF

interfering signal level condition. These three data sets are clearly seen, one clustered about the 45dB Audio WQP SNR horizontal line and two others clustered about the 20 and 30 dB RF d/u Ratio lines. This relation is pointed out here in this moderately clear graph because later graphs with more or less data and more scatter make the depiction less clear.

On each graph several linear trend lines are drawn for some of the receivers. Two receivers are chosen for trend lines from each of the three receiver sample sets; automobile, portable and fixed Hi-Fi. The two lines for each set are drawn for the receivers with the best and worst apparent performance in each test. Hence three sets of upper and lower performance bound lines are drawn on each graph. In the moderately well behaved co-channel test graph this is clearly shown.

The slope of the resulting Audio WQP to RF d/u ratio in this graph is very nearly 1:1, slightly more for the upper left quadrant lines and slightly less for the lower right quadrant lines. The upper left area of each graph represents better overall performance, good audio at poor RF d/u values. The lower right quadrant area represents worse performance. For this test the sample receivers produced the fixed desired 45 dB Audio WQP performance over a relatively wide 17 dB span of d/u ratios, from approximately 34 to 51 dB d/u ratio. Conversely, at the fixed FCC required co-channel RF protection ratio of 20 dB d/u, the audio performance ranged over a similarly wide 14 dB span from approximately 17 to 31 dB WQP SNR. Within each of the three categories of test receivers the variability from best to worst were as follows;

Automobile, approximately 16 dB RF d/u ratio and 12 dB Audio WQP SNR.

Portable, approximately 13 dB RF d/u ratio and 9 dB Audio WQP SNR.

Fixed Hi-Fi, approximately 2 dB RF d/u ratio and 2 dB Audio WQP SNR..

## FIRST ADJACENT CHANNEL MEASUREMENTS

The next performance measurements were made with the interfering RF signal on the FM channel first adjacent to the desired channel, one above and one below the desired

channel (+/- 200 kHz). Hence the designation of +/- 1<sup>st</sup> Adjacent Channel. The measurements were made in two separate groups, on the upper and then the lower channel. They are reported and also graphed in these two groups. In this test some characteristics are revealed, quite different than those for the co-channel tests. Some of the linear trend lines have the same lower left to upper right slope as seen earlier. However, some are quite steep, nearly vertical, while some are quite shallow, even horizontal or slightly negative slope. The near vertical lines indicate receivers which have a very sudden onset of receiver degradation with increasing interference. The near horizontal lines indicate receivers which have nearly constant audio performance with various RF interference. As a result the variation within the three groups; automobile, mobile and fixed Hi-Fi can not realistically be given a range of variation. With slopes so close to the axis of the graph, some would have nearly zero and some nearly infinite variation.

A second trend now seen on the adjacent channel test graphs, and tabulated in the CEMA test report, is the asymmetry between the upper and the lower adjacent channel tests for some individual receivers. This artifact is most likely due to the asymmetry or mistuning of the receiver RF and IF components.

The sample of all 16 test receivers, on both the upper and lower adjacent channel tests, achieved audio performance at the desired 45 dB WQP SNR ratio with RF interfering signals which varied over a very wide 47 dB range, from good performance at approximately -10 dB d/u to a poor +37 dB d/u. At the fixed FCC d/u ratio of +6dB, the audio performance ranged over the wide range of 41 dB, from approximately 23 dB WQP SNR to approximately 64 dB WQP SNR.

## SECOND ADJACENT CHANNEL MEASUREMENTS

The second adjacent tests show a similar range of performance trends, from gently sloping (improving audio performance with diminished RF interference) to nearly flat (good audio performance regardless of interference). The range of performance is widening, but the general limits of performance for the group of receivers can still be listed. For all receivers the 45 dB audio WQP SNR performance ranges over the RF interference d/u ratio range from approximately -57 to approximately +6 dB, a span of 63 dB. At the FCC

specified second adjacent channel d/u ratio of -20 dB, the audio performance ranges over a 59 dB span, from approximately 1dB WQP SNR (near total noise failure) to approximately +60 dB.

A trend, identified earlier, is seen in receiver 3 which reaches 0 dB audio SNR at -20 dB d/u for the upper adjacent channel test but does modestly better for the lower adjacent test. Receiver 16 performs in the opposite, failing earlier on the lower test than on the upper. This is a clear example of the asymmetry mentioned earlier.

A new trend is also evident in some of the receiver performance measurements, some are driven to the point of failure at or near the 0 dB WQP SNR value and stay at 0 dB WQP SNR for all higher interference cases. Receivers 3 and 13 indicate this trend on one or the other of the graphs.

### THIRD ADJACENT CHANNEL MEASUREMENTS

The final series of tests covered the third adjacent channel relationships. The trend now is more toward nearly horizontal performance curves, a fixed audio performance is delivered regardless of the interference level for more of the receivers than in earlier graphs. However, several receivers still have sloping performance trends, some at shallow slope angles. Ascribing any range of performance to this test as a whole is impossible since some receivers had good performance regardless of d/u ratio while others had poor performance or failed, even with relatively good d/u ratio.

Clustering by receiver category is now becoming clear. The automobile receivers are all clustered near the top audio performance sections of the graphs. The portable receivers are broadly spread over the lower performance parts of the test range and the fixed home Hi-Fi receivers are clustered moderately tightly in the mid part of the test result graphs. Some still maintain a linear improvement trend versus interference.

### CONCLUSIONS

Some broad conclusions can be drawn about modern receiver audio performance

under various conditions of interference.

For co-channel conditions the audio quality of all receivers degrades (or improves) quite quickly and uniformly for a corresponding change in interfering signal level. Indeed there is almost a 1:1 improvement factor where 1 dB less interference means 1dB better audio (within limits of course). However, the ultimate audio performance, defined here at the 45 dB audio WQP SNR ratio still exists over a wide 18 dB range of interference d/u ratios, from about 34 to 52 dB.

At the FCC mandated co-channel d/u ratio of 20 dB, the WQP SNR audio performance of present day stereo receivers is quite poor. It covers a 14 dB range, from 17 dB to 31 dB WQP SNR. This is at least 14 dB and as much as 28 dB below the 45 dB target value. Along the interference axis the d/u value necessary to achieve the 45 dB audio target value ranges from 34 dB to as high as 52 dB. This is from 14 to 32 dB above the FCC mandated co-channel RF protection ratio of 20 dB d/u ratio.

Conventional wisdom has it that FM radio receivers have improved over the years. These tests, however, disclose that, on the whole, they have not. The addition of stereo modulation to the FM system, an addition broadly adopted after the FCC made their allocation separation decisions in the early 1960's, imposes approximately a 26 dB noise penalty. This contemporary "improvement" in FM transmission appears to have completely off-set the FM monaural noise advantage used in the early FCC allocation planning factor tests. The technical FM receiver improvements that may have been made over the intervening years have not made up the difference.

Carrying this analysis to the adjacent channels discloses a similar situation. At the FCC mandated RF d/u ratios the audio performance is not good, particularly for 1<sup>st</sup> adjacent channels. Most receivers fall below the target 45 dB audio quality target and many fall below even a 30 dB WQP SNR.

Second and third adjacent channel performance is slightly better overall but with the notable exception of the class of portable receivers, including "Walkman" and "Boom-Box" type receivers, the newest and fastest growing category of receiver. Potentially most

troubling is the trend for some receivers, which may represent a sizable fraction of the present and future receiver population to function very poorly, or to just stop working at all, even at modest RF d/u ratios.

The potential for this rule making to eliminate the second and third adjacent channel protections creates considerable concern for serious interference in the future. Automobile receivers are confined to roadways and, therefore, are limited in their ultimate approach to potential interfering stations. In addition their motion through an area would result in only transient interference, possibly less disrupting than fixed interference. Thus they may, as a class, be less susceptible to all interference. But, automobile receivers are also, as a class, those which are already quite tolerant of second and third adjacent channel interference.

However the personal portable and the fixed Hi-Fi receivers are less tolerant. Also they are used at fixed locations or are slowly carried in portable operation over small areas and hence they, as a group, can not escape from the area of interference created if a second or third adjacent channel station were to locate at or inside an existing service area and near any population area.

In conclusion, the CEMA test data indicates that with the existing and future population of FM receivers, the addition of numerous new potential interfering stations may have a serious detrimental effect on FM broadcast audio and subsidiary communications. The application of very low power, or micro power stations may limit the new interference to very small areas. They may potentially be carefully engineered to control the service where desired and to limit interference to unpopulated areas. Eventually, however, all potential interference must be considered when adopting a plan to add new transmission sources within an existing broadcast band.

Respectfully Submitted,  
Lohnes & Culver

by   
Robert D. Culver, P.E.  
Md. Reg. No. 19672  
July 29, 1999

FIGURE 1

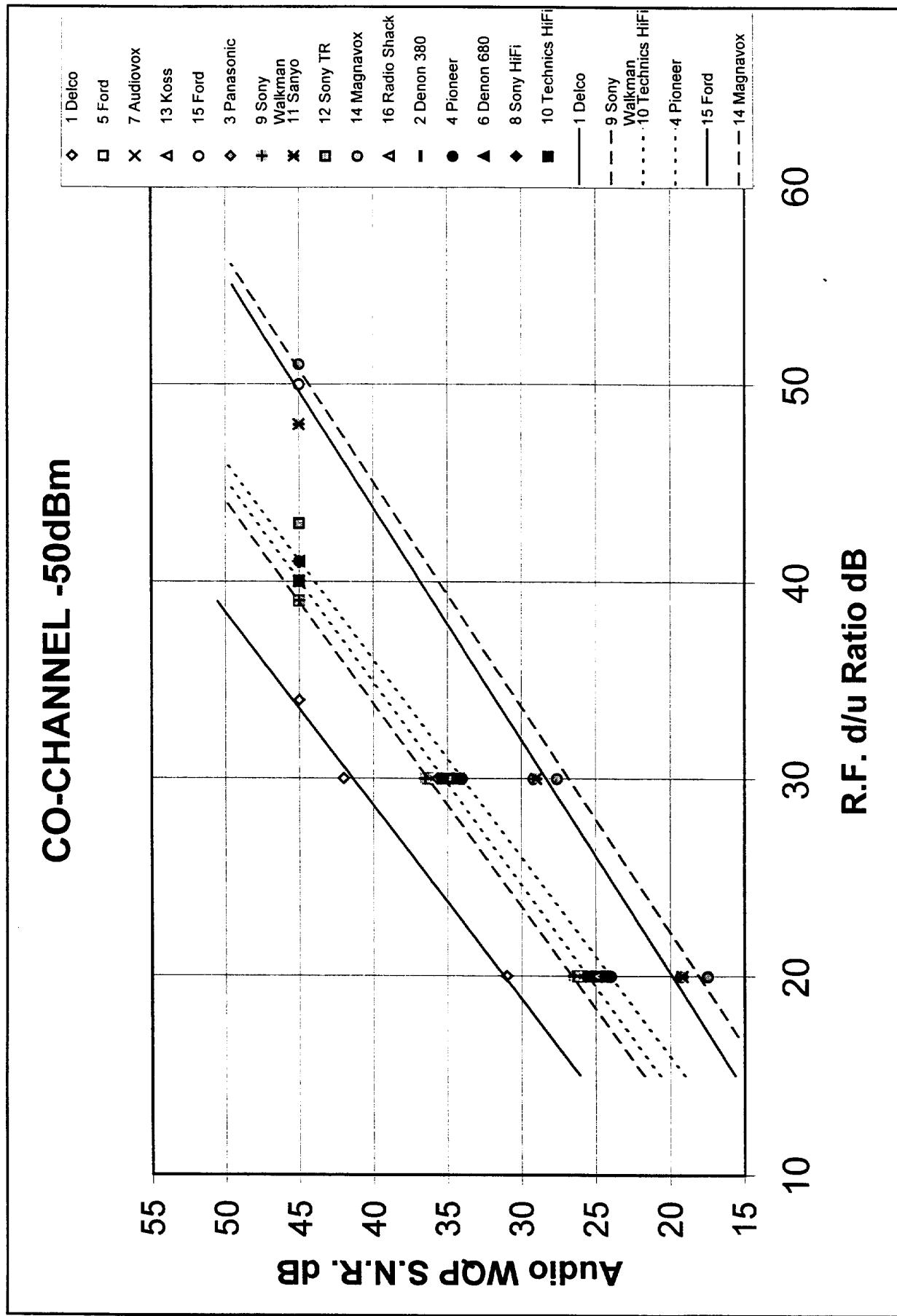
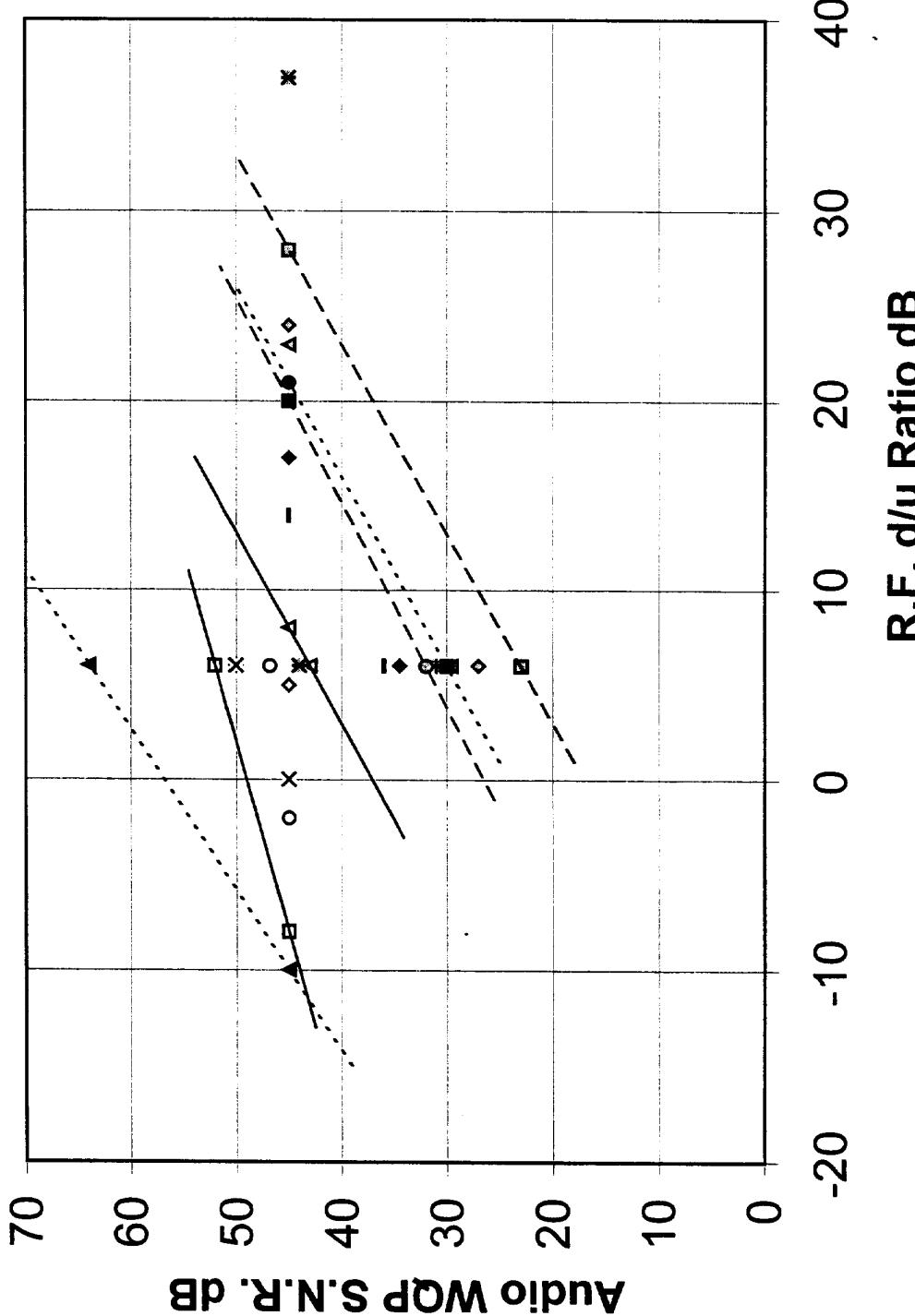


FIGURE 2A

### 1st ADJACENT UPPER -50dBm



## FIGURE 2B

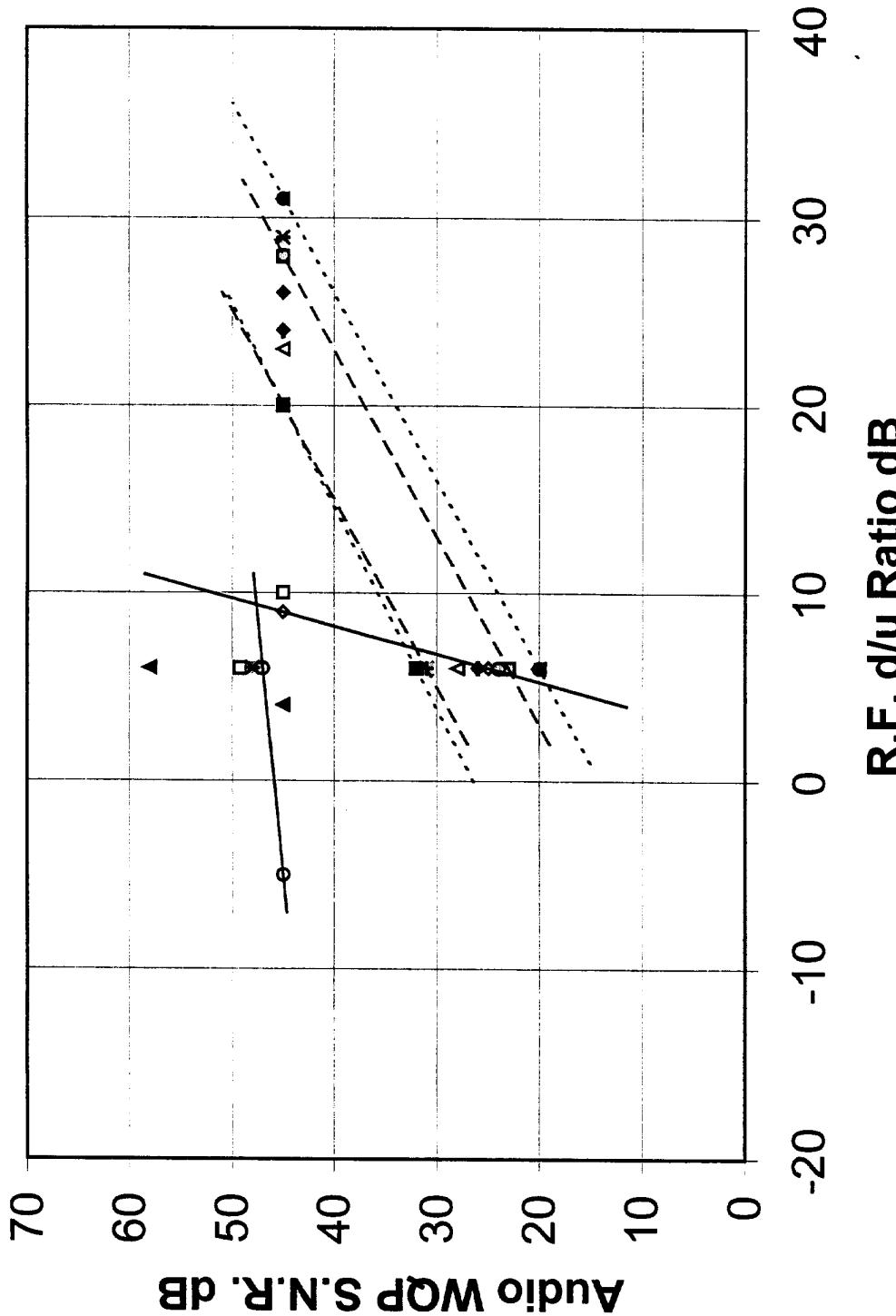
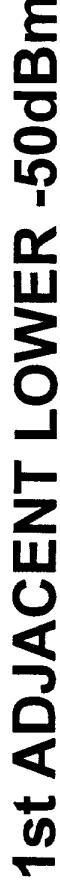


FIGURE 3A

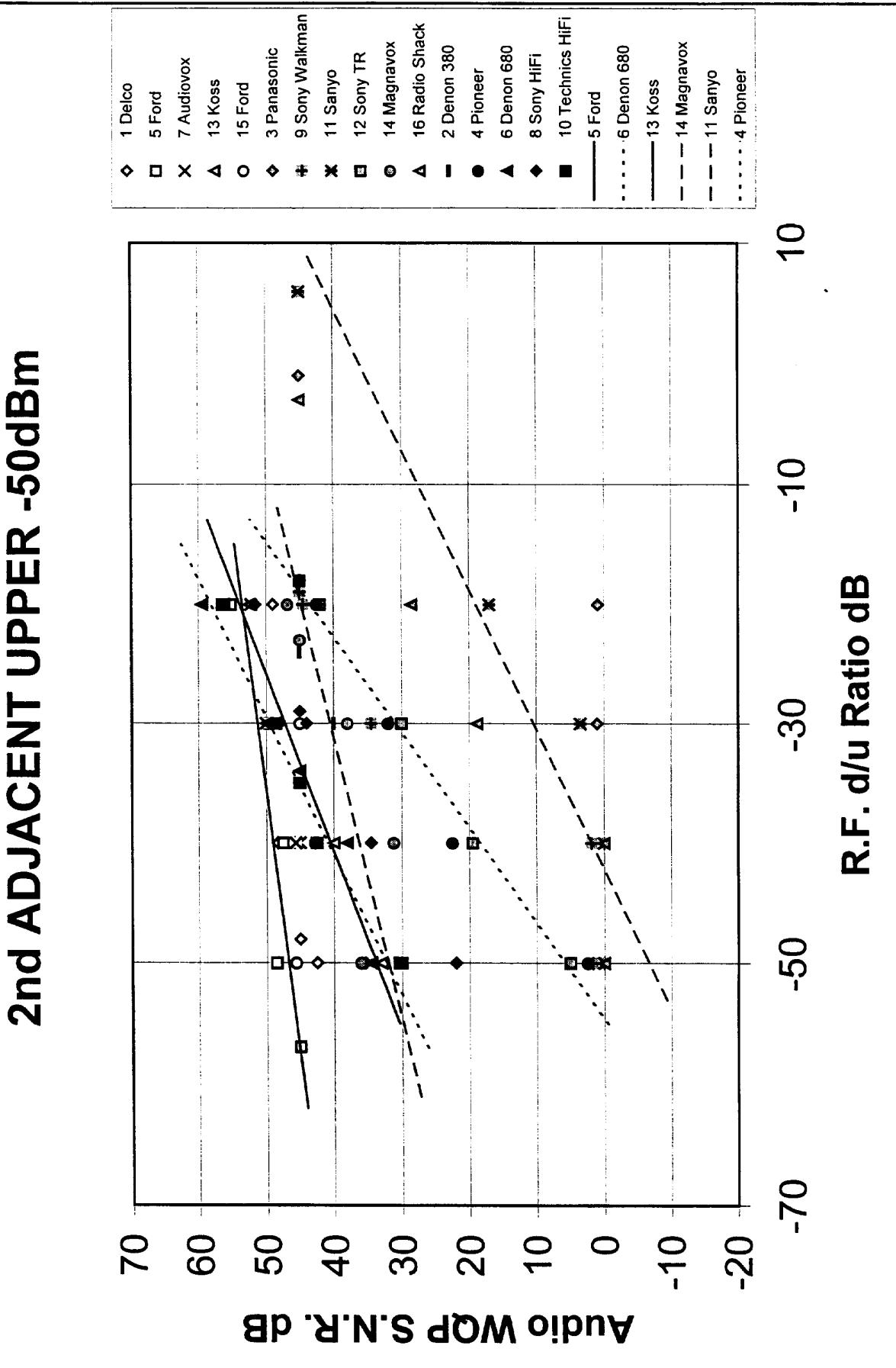


FIGURE 3E

## 2nd ADJACENT LOWER -50dBm

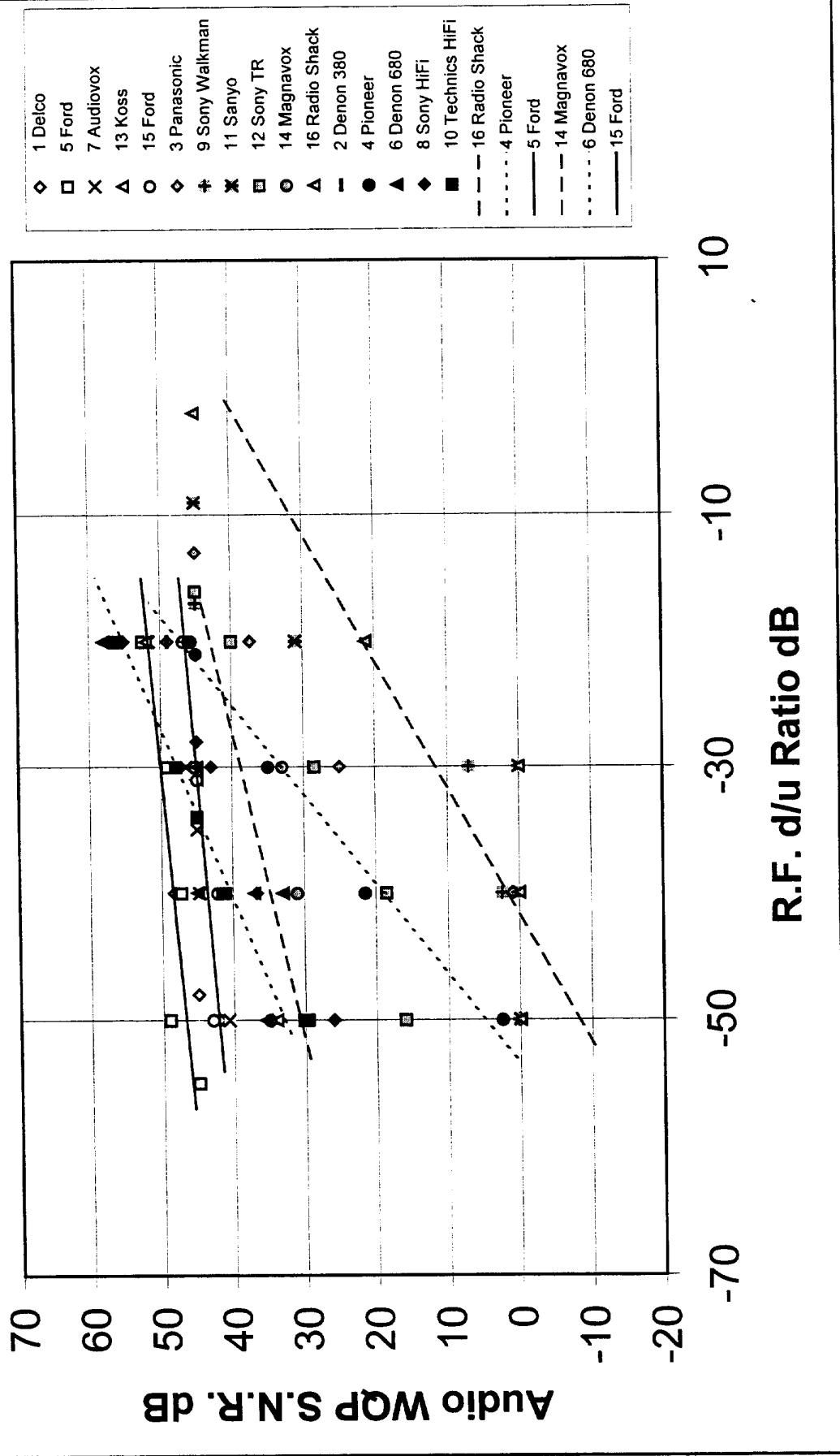
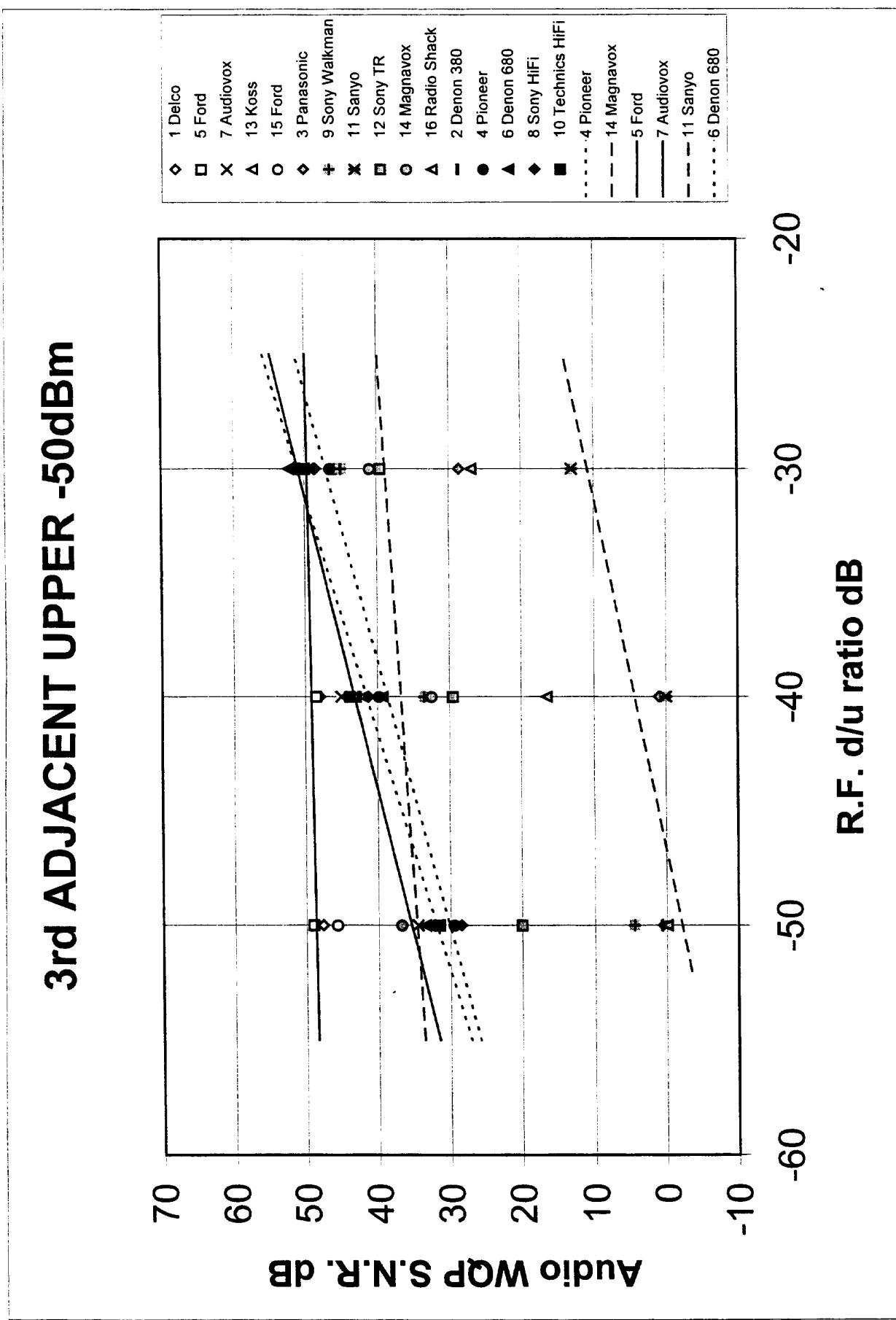


FIGURE 4A



## 3rd ADJACENT LOWER -50dBm

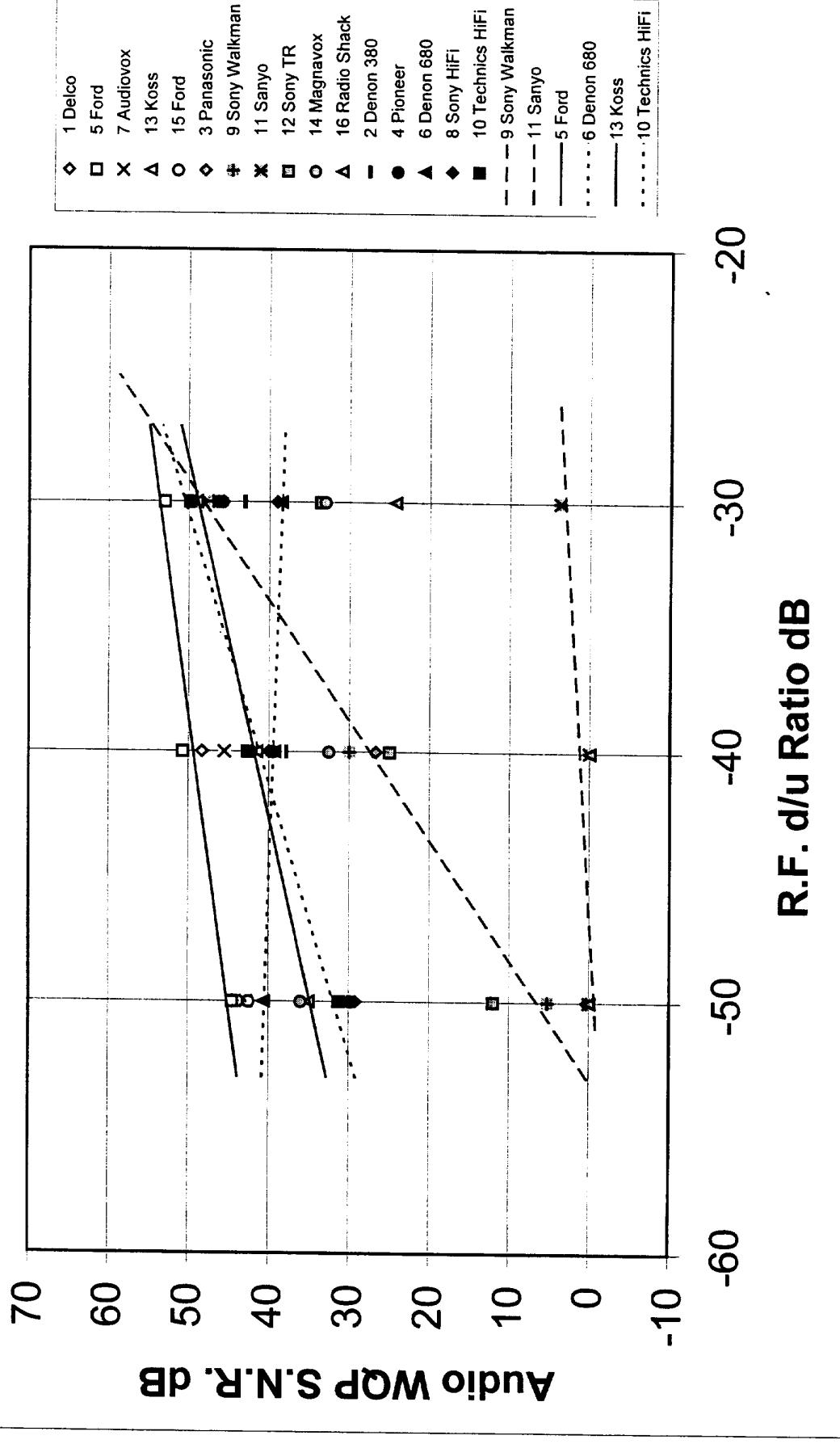


FIGURE 4B

**E**

**Corporation for Public Broadcasting**  
**Network Report ALL CPB-SUPPORTED RADIO (w/Translators)**  
**1990 Census of Population and Housing**

**TABLES: A, B, C, D**

		Station & Translators		Station		Translators	
<b>A PERSONS BY AGE BY SEX</b>							
Universe: Persons							
Total Persons	(% base)	219,430,861		9,064,891		4,356,914	49%
Total Males		106,820,874		57,327		1%	
Males<1 year old	1%	1,054,675	1%	340,947	1%	41%	
Males 1-5 years old	4%	8,482,754	4%	322,406	6%	6%	
Males 6-13 years old	6%	12,873,548	6%	239,460	3%	3%	
Males 14-17 years old	3%	5,881,645	3%	553,108	6%	6%	
Males 18-24 years old	5%	11,985,701	5%	787,304	9%	9%	
Males 25-34 years old	9%	19,446,088	8%	1,977,987	12%	12%	
Males 35-44 years old	13%	27,758,000	13%	343,924	4%	4%	
Males 45-64 years old	4%	8,758,864	4%	67,971	5%	5%	
Males 65+ years old	5%	10,850,743	5%				
Total Females		112,610,047		51%		4,667,977	51%
Females<1 Year old	1%	1,317,393	1%	57,137	1%	1%	
Females 1-5 years old	4%	8,085,526	4%	332,050	6%	6%	
Females 6-13 years old	6%	12,058,703	6%	498,815	6%	6%	
Females 14-17 years old	3%	5,642,736	3%	225,949	2%	2%	
Females 18-24 years old	5%	11,538,684	5%	564,734	6%	6%	
Females 25-34 years old	9%	19,511,901	9%	782,687	9%	9%	
Females 35-44 years old	13%	26,473,483	13%	1,106,257	12%	12%	
Females 45-64 years old	4%	9,733,659	4%	393,751	4%	4%	
Females 65+ years old	7%	16,169,982	7%	716,577	8%	8%	
<b>B PERSONS BY RACE</b>							
Universe: Persons							
Total Persons	(% base)	210,430,861		9,064,891		4,356,914	63%
White persons		174,712,707		7,463,449		3,359,193	92%
Black persons	13%	27,532,633	13%	94,575	10%	705,689	8%
American Indian/Eskimo/Alaska Native	1%	1,405,601	1%	118,357	1%	182,021	2%
Asian/Pacific Islander	3%	6,945,315	3%	334,389	4%	354,314	4%
Persons of other races	4%	8,933,808	4%				
<b>C PERSONS BY HISPANIC ORIGIN BY RACE</b>							
Universe: Persons							
Total Persons	(% base)	219,430,861		9,064,891		4,356,914	92%
Persons not of Hispanic origin	91%	199,701,191	91%	8,359,193		6,359,193	
Persons of Hispanic origin	9%	19,729,670	9%	705,689		705,689	
Persons of Mexican origin	5%	11,848,412	5%	496,952		496,952	
Persons of Puerto Rican origin	1%	2,537,781	1%	62,000		62,000	
Persons of Cuban origin	0%	1,028,152	0%	12,720		12,720	
Persons of other origin	2%	4,515,315	2%	182,923		182,923	
<b>D PERSONS BY HISPANIC ORIGIN BY AREA OF ORIGIN</b>							
Universe: Persons							
Total Persons	(% base)	221,713,259		9,071,259		4,364,891	92%
Persons not of Hispanic origin	91%	199,701,191	91%	8,359,193		6,359,193	
Persons of Hispanic origin	9%	19,729,670	9%	705,689		705,689	
Persons of Mexican origin	5%	11,848,412	5%	496,952		496,952	
Persons of Puerto Rican origin	1%	2,537,781	1%	62,000		62,000	
Persons of Cuban origin	0%	1,028,152	0%	12,720		12,720	
Persons of other origin	2%	4,515,315	2%	182,923		182,923	

Corporation for Public Broadcasting  
 Network Report ALL CPB-SUPPORTED RADIO (w/translators)  
 1990 Census of Population and Housing

TABLES: E, F

	Station & Translators	Station	Translators
<b>E PERSONS 5-17 YEARS OLD BY LANGUAGE SPOKEN AT HOME BY ABILITY TO SPEAK ENGLISH</b>			
Total persons 5-17 years old	40,049,229	39,613,682	1,620,677
Speak only English at home	34,359,767	33,941,588	86% 1,445,391 89%
Speak language other than English	5,713,462	5,672,094	14% 175,266 11%
Speak Spanish at home	3,777,884	3,684,213	9% 117,445 7%
Speak English very well or well	3,138,650	3,111,006	8% 100,337 6%
Speak English not well or at all	681,238	577,207	1% 17,108 1%
Speak Asian language at home	785,550	783,116	2% 22,868 1%
Speak Asian language very well or well	662,684	660,481	2% 18,877 1%
Speak English not well or at all	132,962	132,837	0% 4,791 0%
Speak Eng not well or at all	1,200,024	1,180,763	3% 34,173 2%
Speak other language at home	1,085,932	1,078,473	3% 30,863 2%
Speak English very well or well	113,092	112,290	0% 3,290 0%
<b>F PERSONS 18+ YEARS OLD BY LANGUAGE SPOKEN AT HOME BY ABILITY TO SPEAK ENGLISH</b>			
Total persons 18+ years old	165,317,710	163,655,941	6,711,460
Speak only English at home	141,841,631	140,338,958	86% 6,042,209 89%
Speak language other than English	23,466,079	22,316,983	14% 739,271 11%
Speak Spanish at home	11,905,357	11,082,354	7% 409,558 6%
Speak Spanish at home	8,439,082	8,355,850	5% 312,638 5%
Speak English very well or well	3,646,295	3,526,495	2% 87,871 1%
Speak English not well or at all	3,853,003	3,644,154	2% 94,489 1%
Speak Asian language at home	2,612,833	2,635,811	2% 69,355 1%
Speak English very well or well	810,250	918,349	1% 24,334 0%
Speak English not well or at all	7,957,639	7,880,475	5% 244,223 3%
Speak other language at home	7,054,642	6,985,311	4% 220,334 3%
Speak English very well or well	901,097	895,164	1% 23,869 0%

**Corporation for Public Broadcasting**  
**Network Report ALL CPB-SUPPORTED RADIO (w/translators)**  
**1980 Census of Population and Housing**

**TABLE J, K, L, M**

		Station & Translators	Station	Translators
<b>J PERSONS 5 YEARS AND OVER BY LANGUAGE SPOKEN</b>				
Total persons 5 years and over	205,388,939	86%	203,289,823	84,402,157
Speak only English	176,777,398	86%	174,200,546	7,487,800
Speak Asian language	2,938,870	1%	2,931,926	1%
Speak Chinese	1,301,678	1%	1,298,739	1%
Speak Japanese	493,112	0%	401,901	0%
Speak Mon-Khmer	126,294	0%	126,049	0%
Speak Korean	612,723	0%	611,453	0%
Speak Vietnamese	485,063	0%	493,184	0%
Speak Native North American Language	161,685	0%	151,849	0%
Speak Spanish or Spanish Creole	16,703,245	8%	15,570,587	8%
Speak other language	10,405,741	5%	10,335,835	5%
Total persons not born in US	16,813,498	16%	16,759,389	16%
Year of entry 1887 - 1890	3,011,919	16%	3,001,863	16%
Year of entry 1890 - 1894	5,304,981	28%	5,287,518	28%
Year of entry 1890 - 1958	4,632,046	25%	4,816,191	26%
Year of entry 1890 - 1979	2,855,943	14%	2,645,508	14%
Year of entry 1890 - 1959	1,985,894	8%	1,487,774	8%
Year of entry before 1950	1,711,945	9%	1,700,515	9%
Total persons not born in US	211,928,239	73%	209,744,288	71%
153,883,060	73%	162,086,828	71%	
58,246,179	27%	57,657,842	27%	
48,770,170	23%	48,251,000	23%	
9,476,000	4%	9,406,573	4%	
4,073,610	2%	4,023,180	2%	
2,376,853	1%	2,346,943	1%	
1,697,747	1%	1,684,227	1%	
37,598,051	18%	37,163,791	18%	
33,886,545	18%	33,304,926	18%	
3,913,086	2%	3,984,986	2%	
16,672,918	8%	16,430,671	8%	
12,707,722	8%	12,593,301	8%	
3,865,180	2%	3,837,370	2%	
Total persons 10 - 19 years old	494,681,985	34%	481,739,628	33%
In the armed forces	977,623,288	66%	960,502,350	67%
Civilians	974,900,246	66%	957,805,870	67%
Enrolled in school	2,723,043	0%	2,686,471	0%
Not enrolled in school	1,318,494	0%	1,304,172	0%
High school graduates	921,077	0%	911,330	0%
Employed	157,868	0%	155,779	0%
Not employed	239,749	0%	237,093	0%
Not in labor force	1,404,549	0%	1,392,299	0%
Not high school graduate	562,812	0%	560,858	0%
Employed	241,833	0%	239,346	0%
Not employed	597,104	0%	592,013	0%
Total persons 10 - 19 years old by school enrollment and labor force status	1472245254	1442241978	31,356,542	
Total persons 10 - 19 years old	494,681,985	34%	481,739,628	33%
In the armed forces	977,623,288	66%	960,502,350	67%
Civilians	974,900,246	66%	957,805,870	67%
Enrolled in school	2,723,043	0%	2,686,471	0%
Not enrolled in school	1,318,494	0%	1,304,172	0%
High school graduates	921,077	0%	911,330	0%
Employed	157,868	0%	155,779	0%
Not employed	239,749	0%	237,093	0%
Not in labor force	1,404,549	0%	1,392,299	0%
Not high school graduate	562,812	0%	560,858	0%
Employed	241,833	0%	239,346	0%
Not employed	597,104	0%	592,013	0%

**Corporation for Public Broadcasting**  
**Network Report ALL CPB-SUPPORTED RADIO (without stations)**  
**1990 Census of Population and Housing**

**TABLES: N, O, P, Q**

		Station & Translation	Station	Translation
<b>N PERSONS 16+ BY VETERAN STATUS</b>				
Total persons 16+ years old	171,270,914	169,525,961	7,015,209	1%
In armed forces	1,539,378	1% 1,523,887	43,377	1%
Civilian	160,731,536	99% 168,002,084	6,971,832	99%
Veteran	24,357,098	14% 24,089,256	1,042,013	15%
Non-veteran	145,374,437	85% 143,932,539	5,939,810	85%
<b>O PERSONS 18+ YEARS OLD BY LABOR FORCE STATUS AND OCCUPATION</b>				
Total persons 18+ years old	171,270,914	169,526,961	7,015,209	1%
In armed forces	1,539,378	1% 1,523,887	43,377	1%
In civilian labor force	111,308,844	65% 110,280,778	4,463,457	64%
Managerial & professional	28,230,476	16% 28,002,668	1,116,248	16%
Technical, sales & administrative support	30,718,549	20% 33,429,954	1,325,163	18%
Service	13,721,460	2% 13,583,990	634,386	9%
Farming, forestry, fishing	2,181,571	1% 2,165,203	89,190	1%
Precision production, craft & repair	11,561,965	7% 11,443,197	42,946	6%
Operations, fabricators & laborers	14,952,687	9% 14,777,041	575,259	8%
Unemployed	6,933,136	4% 6,858,779	295,268	4%
Not in labor force	58,421,591	34% 57,741,316	2,503,376	36%
<b>P PERSONS 16+ YEARS OLD BY LABOR FORCE STATUS AND INDUSTRY</b>				
Total persons 16+ years old	171,270,914	169,526,961	7,015,209	1%
In armed forces	1,539,378	1% 1,523,887	43,377	1%
In civilian labor force	111,308,844	65% 110,280,778	4,463,457	64%
Agriculture, Forestry, Fishing, Mining	2,942,751	2% 2,887,380	144,086	2%
Construction	6,382,517	4% 6,319,851	239,041	3%
Manufacturing	18,185,440	11% 18,042,813	758,977	9%
Transportation	4,871,551	3% 4,631,915	189,246	2%
Communications and other public utilities	2,860,167	2% 2,780,992	111,224	2%
Wholesale & retail trade	22,258,772	13% 22,032,851	946,252	13%
Finance, Insurance & real estate	7,486,715	4% 7,416,276	258,091	4%
Business, repair & personal services	6,484,862	5% 6,409,425	357,738	5%
Educator & recreation services	1,500,010	1% 1,494,260	71,351	1%
Health & education services	17,512,551	10% 17,337,776	704,188	11%
Public administration	7,126,891	4% 7,071,381	287,002	4%
Other professional & related services	5,024,452	3% 4,976,191	214,396	4%
Unemployed	6,933,136	4% 6,858,779	280,206	4%
Not in labor force	58,421,591	34% 57,741,316	2,503,375	36%
<b>Q WORKERS BY SECTOR</b>				
Universe: Employed persons 16 years and over				
All workers	104,376,708	103,401,899	4,164,191	68%
Private for profit wage & salary workers	74,032,151	71% 73,372,814	2,831,719	71%
Private not-for-profit wage & salary workers	7,135,800	7% 7,086,624	31,085	7%
Government workers	16,794,145	15% 16,626,761	711,870	17%
Local government workers	7,427,051	7% 7,348,244	391,567	7%
State government workers	4,763,581	5% 4,707,638	268,683	6%
Federal government workers	3,803,513	3% 3,572,909	140,640	3%
Self-employed workers	6,991,439	7% 6,913,620	285,102	7%
Unpaid family workers	423,364	0% 419,056	15,415	0%

**Corporation for Public Broadcasting**  
**Network Report ALL CPB-SUPPORTED RADIO (w/Translators)**  
**1990 Census of Population and Housing**

TABLES: R, S, T, U

		Station & Translation	Station	Station & Translation	Station	Translators
<b>R PERSONS 18+ YEARS OLD BY YEARS OF SCHOOL COMPLETED</b>						
Total persons 18+ years old	165,337,710	9%	163,855,941	9%	6,781,480	8%
Less than 9th grade	14,759,236	15%	14,803,880	15%	861,677	14%
9th to 12th grade, no diploma	24,611,448	15%	24,346,848	15%	1,956,827	29%
High school (4 years)	46,026,721	30%	49,450,178	30%	1,580,110	23%
Some college, no degree	34,821,208	21%	34,579,037	21%	430,808	6%
Associate degree	10,086,069	6%	9,981,363	6%	BB5,443	13%
Bachelor degree	21,106,186	13%	20,937,711	13%	440,306	8%
Graduate or professional degree	10,824,816	7%	10,748,885	7%		
<b>S HOUSEHOLDS BY INCOME</b>						
Total households	82,169,986	16%	81,240,778	15%	3,495,418	18%
Income less than \$10,000	12,227,008	15%	12,058,137	15%	838,324	20%
Income \$10,000 - \$19,999	14,093,189	17%	13,502,643	17%	712,724	18%
Income \$20,000 - \$29,999	13,643,574	17%	13,481,763	17%	620,899	18%
Income \$30,000 - \$49,999	21,200,530	26%	20,388,556	26%	855,381	24%
Income over \$50,000	20,945,885	26%	20,809,677	26%	683,268	19%
<b>T FAMILIES BY FAMILY INCOME</b>						
Total families	57,714,374	9%	57,104,533	9%	2,260,672	11%
Income less than \$10,000	5,286,565	9%	5,217,238	9%	250,089	11%
Income \$10,000 - \$19,999	8,378,912	15%	8,260,521	14%	397,287	17%
Income \$20,000 - \$29,999	9,386,926	16%	9,266,254	16%	419,667	18%
Income \$30,000 - \$49,999	16,567,021	29%	16,410,197	29%	656,717	29%
Income over \$50,000	16,075,030	31%	17,954,325	31%	556,912	24%
<b>U NONFAMILY HOUSEHOLDS BY INCOME</b>						
Total unrelated individuals 15+ years old	24,385,766	30%	24,132,398	30%	1,214,744	33%
Income less than \$10,000	7,295,466	30%	7,192,041	30%	404,212	37%
Income \$10,000 - \$19,999	6,921,745	29%	5,847,177	24%	322,314	27%
Income \$20,000 - \$29,999	4,271,268	18%	4,235,986	18%	207,885	17%
Income \$30,000 - \$49,999	4,422,855	18%	4,393,868	18%	186,278	16%
Income over \$50,000	2,475,371	10%	2,462,298	10%	94,255	8%

**Corporation for Public Broadcasting**  
**Network Report All CPB-SUPPORTED RADIO (w/translators)**  
**1990 Census of Population and Housing**

**TABLES: V, W**

	Station & Translators	Station	Translators

**V HOUSEHOLDS BY RACE OF HOUSEHOLDER BY HOUSE**

<b>TYPE &amp; PRESENCE OF CHILDREN</b>			
Total households	62,109,966	83%	3,495,416
Households with white householder	66,173,833	83%	2,889,413
Married couple families	39,651,761	48%	1,582,215
With own children	17,972,721	22%	697,100
Without own children	21,779,040	27%	885,115
Family with male householder, no wife present	1,980,854	2%	25%
With own children	792,788	1%	78,474
Without own children	1,008,065	1%	36,851
Family with female householder, no husband present	6,853,032	7%	1%
With own children	3,065,380	4%	41,823
Without own children	2,787,713	3%	1%
Nonfamily households	29,778,175	25%	264,396
Households with black householder	9,225,214	11%	8%
Married couple families	5,237,510	4%	168,746
With own children	1,716,957	2%	4%
Without own children	1,521,553	2%	108,820
Family with male householder, no wife present	453,819	1%	3%
With own children	203,092	0%	30%
Without own children	250,427	0%	1,084,330
Family with female householder, no husband present	2,824,950	3%	3%
With own children	1,174,113	2%	1%
Without own children	1,050,846	1%	108,648
Nonfamily households	2,694,826	3%	3%
Households with other race householder	4,710,889	6%	5%
Married couple families	2,768,115	3%	3%
With own children	1,045,573	2%	2%
Without own children	912,542	1%	29,940
Family with male householder, no wife present	107,987	0%	1%
With own children	126,532	0%	0%
Without own children	171,436	0%	6,056
Family with female householder, no husband present	728,043	1%	0%
With own children	474,334	1%	30,040
Without own children	251,700	0%	1%
Nonfamily households	910,764	1%	1%

<b>W HOUSEHOLDS BY HISPANIC ORIGIN OF HOUSEHOLDER BY HH TYPE AND PRESENCE OF CHILDREN</b>			
Total households with householder Hispanic origin	5,310,757	56%	197,380
Married couple families	2,982,170	56%	106,351
With own children	1,977,749	37%	54%
Without own children	1,023,400	19%	36,695
Family with male householder, no wife present	378,220	7%	19%
With own children	161,850	3%	4%
Without own children	196,378	4%	12,737
Family with female householder, no husband present	653,816	12%	34,131
With own children	321,589	6%	24,159
Without own children	318,973	8%	9,972
Nonfamily households	1,017,358	19%	44,164

**Corporation for Public Broadcasting  
Network Report All CPB-SUPPORTED RADIO (w/translators)**  
**1980 Census of Population and Housing**

	TABLES: X, Y, Z, AA	Station & Translators	Station	Translators
<b>X CHILDREN BY AGE BY HOUSEHOLD TYPE</b>				
Universe: Own children under 18 years				
Total children under 18 years	51,101,890	50,546,637	17%	2,084,450
Children under 3 years	8,542,187	8,454,430	17%	350,301
In married couple family	7,003,136	6,932,650	16%	273,760
In family with male householder, no wife	1,314,920	1% 311,204	1%	14,949
In family with female householder, no husband	1,224,151	1,210,570	2%	62,012
Children 3-5 years	8,874,377	17%	17%	367,400
In married couple family	7,052,372	14%	14%	280,107
In family with male householder, no wife	282,684	1%	1%	13,440
In family with female householder, no husband	1,539,521	3%	3%	74,253
Children under 6-11 years	17,567,502	34%	34%	726,364
In married couple family	13,672,063	27%	27%	649,323
In family with male householder, no wife	583,700	1%	1%	25,109
In family with female householder, no husband	3,321,739	7%	7%	151,877
Children under 12-14 years	8,205,580	16%	16%	333,504
In married couple family	6,285,248	12%	12%	249,050
In family with male householder, no wife	288,817	1%	1%	12,448
In family with female householder, no husband	1,850,695	3%	3%	71,986
Children under 15-17 years	7,912,354	15%	15%	308,741
In married couple family	5,945,200	12%	12%	227,281
In family with male householder, no wife	313,417	1%	1%	12,868
In family with female householder, no husband	1,633,737	3%	3%	64,512
<b>Y PERSONS WITH INCOME BELOW POVERTY LEVEL, BY AGE</b>				
Universe: Persons for whom poverty status is determined				
Total persons below poverty level	27,341,838	27,005,688	14%	1,343,252
Under 6 years old	3,758,978	14%	14%	186,782
6-11 years old	3,310,994	12%	12%	153,828
12-17 years old	2,742,275	10%	10%	119,278
18 years old and over	17,521,501	64%	64%	883,563
<b>Z CHILDREN BELOW POVERTY LEVEL BY HOUSEHOLD TYPE</b>				
Universe: Related children under 18 years				
Total children below poverty level	9,588,121	9,468,968	14%	447,282
Under 6 years old	3,758,978	39%	39%	186,782
In married couple family	1,422,933	15%	15%	63,339
In family with male householder, no wife	2,003,678	2%	2%	10,016
In family with female householder, no husband	2,135,367	22%	22%	107,427
6-17 years old	5,827,143	61%	61%	260,500
In married couple family	2,181,181	23%	23%	93,906
In family with male householder, no wife	280,923	3%	3%	13,249
In family with female householder, no husband	3,355,028	35%	35%	151,345
<b>AA HOUSEHOLDS BELOW POVERTY LEVEL BY HOUSEHOLD TYPE</b>				
Universe: Households below poverty level				
All households below poverty level	10,058,518	9,927,212	23%	521,132
In married couple family	2,318,818	23%	23%	102,835
In family with male householder, no wife	351,409	3%	3%	16,689
In family with female householder, no husband	2,862,326	20%	20%	138,108
Householders living alone	3,731,359	37%	37%	198,588
Householders not living alone	794,808	8%	8%	64,934

**Corporation for Public Broadcasting  
Network Report ALL CPB-SUPPORTED RADIO (w/Translators)  
1990 Census of Population and Housing**

TABLES: BB, CC		Station & Translator		Station		Translators							
<b>BB HOUSING UNITS IN URBANIZED AND RURAL AREAS</b>													
Total housing units	96,300,186		89,276,714		3,947,412								
Inside urbanized area	62,232,402	69%	61,924,427	69%	2,317,325	69%							
Outside urbanized area	3,150,453	10%	8,735,381	10%	1,017,788	26%							
Rural	16,987,331	21%	16,615,326	21%	612,299	16%							
Farm	1,023,051	1%	1,016,848	1%	17,713	0%							
Non-Farm	17,964,280	20%	17,599,778	20%	594,986	15%							
<b>CC PERSONS IN URBANIZED AND RURAL AREAS</b>													
Total persons	221,713,258		219,430,861		9,084,091								
Inside urbanized area	153,560,261	69%	152,742,182	70%	5,398,127	60%							
Outside urbanized area	22,171,427	10%	21,269,877	10%	2,319,476	26%							
Rural	45,981,571	21%	45,418,822	21%	1,347,248	15%							
Farm	2,852,459	1%	2,824,328	1%	49,561	1%							
Non-Farm	43,128,112	19%	42,583,896	19%	1,298,607	14%							