

Research Guidelines For Programming Decision Makers

a programmer's guide to the dynamics of radio

ARBITRON RADIO

Introduction

Good programming involves many factors, and effective use of research is one. But some programmers, who are unfamiliar with research, tend to shy away from using it. Analyzing audiences is a simple process.

Arbitron has prepared this guide for programming decision makers to help them better understand the details of audience measurement and more importantly, the effective use of estimates as a decision-making tool.

This booklet is divided into three sections:

1. Understanding the Marketing Factors That Influence Your Audience.
2. Definitions of Basic Research terms and Solving Programming Problems using the Arbitron Radio Market Report.
3. How Arbitron Measures Radio and How to Calculate the Reliability of the Estimates.

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SECTION ONE

**Understanding the
Marketing Factors That
Influence Your Audience**

What Is the Name of Your Radio Station?

Radio is the medium of companionship. Most often, radio listeners are involved in another primary activity such as driving the car, weeding the garden, reading or working; all activities done as people listen to radio.

One of your most important tasks is impressing upon the listener the name of your radio station. Each day, the average consumer hears or sees thousands of advertisements of one kind or another. The challenge is to have the name of your station one of the few that he remembers.

How Well Do You Remember Slogans?

Let's look at the slogans for 10 consumer products for some lessons on slogan effectiveness.

SLOGAN AWARENESS TEST

See if you can name the products which go along with these slogans:

1. The real thing _____
2. For the business of management _____
3. We're involved _____
4. The uncola _____
5. The on-time airline _____
6. We know what you're looking for _____
7. The dependability people _____
8. We try harder _____
9. The company _____
10. Flying colors _____

(see the answers on the next page)

Answers to Slogan Awareness Test

1. The real thing – Coca-Cola
2. For the business of management – Bank of America
3. We're involved – U.S. Steel
4. The uncola – 7-Up
5. The on-time airline – TWA
6. We know what you're looking for – J.C. Penney
7. The dependability people – Maytag
8. We try harder – Avis
9. The company – Textron
10. Flying colors – Braniff

Some of the most successfully marketed products promote brand awareness (your station name) with a *single* slogan which is designed to complement the brand name, i.e., add life to it.

Station slogans fall into three categories:

1. Dial Position: Designed to let listeners know where to find the station on the dial.
Q-105 W-100
M-104 13-Q
2. The Station's Format: Designed to let listeners know the kind of programming being offered.
E-Z Music
The Mellow Sound
New York's Best Rock

Some stations combine 1 and 2:

Newsradio 88
Live News 98

3. Other stations have the benefit of names as a part of their call letters:
KRTH(K-Earth) WEEL(Wheel)
WLIF(Life) WMGC(Magic)
WAYS(Big Ways) KABL(Cable)

It is easier for a listener to remember your station if it has *one name*. Any more than that can lead to confusion.

Why Do You Remember Some Slogans?

In the slogan awareness test, the slogans you remembered are probably slogans for product categories which you sometimes use. For instance, if you are a soft drink user, you probably identified the two soft drink slogans.

When was the last time you recognized an advertisement for an automobile? If you think back, you probably do not remember noting any automobile ads, unless you were in the market for a car.

Suppose you are in the market for a car. Your mind becomes aware each time you note a car ad. Even for a period of time after your car purchase, automobile advertising comes into your thought banks to reassure you that you have done the right thing.

This thought process is called the human cue mechanism. It is important because it is the valve through which your station's name must pass in order to make an impression on the listener. Thousands of advertisements go by us each day. Only those which we select to perceive will trigger our human cue mechanism.

Once a listener allows the name of a radio station through the valve, there are barriers to overcome.

It has been estimated that over 30% of the country's population has less than perfect hearing, and that many letters sound alike to the ear.

B sounds like P sounds like T sounds like D, like V.

also . . .

F sounds like S sounds like X

M sounds like N

I sounds like Y

Look at the possible aberrations for these call letters:

WYBI: WIVI WYEV WYBY

These are but three of the 40 possible aberrations just from sound-alike letters. Now, try your call letters. What are the possible aberrations:

Your call letters _____

Possible aberrations:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

There are also handwriting aberrations:

H looks like K and R

I looks like L and T and J

O looks like Q

X can look like Y

U looks like V

. . . ad infinitum.

Look at your station mail. Envelope addresses often alert you to possible listener confusion. A special question on your request line can also help you find out more about what people call your station.

Arbitron's Editing Department resolves these many aberrations as part of the editing process.

What Influences Listening Behavior?

THE THREE KEY GROUPS THAT MAKE UP YOUR STATION'S LISTENERS

Your radio station's sound is your product. It is much like a box of soap sitting on a grocer's shelf, waiting to be purchased. There are many factors which affect a consumer's decision to purchase the product (*tune in the station*). Product purchasers themselves may be divided into three basic categories.

1. **Exclusive Users**—Those consumers who purchase only a particular product. (In radio, this type of listener generates exclusive cumes, spends all his time with one station.)
2. **Brand Loyals**—Those consumers who primarily purchase a particular brand but occasionally, for reasons of convenience or need satisfaction, purchase another brand. (In radio, this is the core or base audience that listens to one station, but listens occasionally to another station.)
3. **Users**—Those consumers who sometimes purchase a particular product, but more often buy a different one. (In radio, this is the listener who spends some time with one station, but spends more time with other stations during the broadcast week.)

The *User* can be classified in three sub-groups:

1. **Occasional User**—The consumer who primarily purchases another brand; he is *Brand Loyal* to another brand's product. But he will occasionally use your brand to satisfy one or more of the following needs:
 - *Convenience*—The favorite brand is unavailable, or is not conveniently accessible. (In radio, the listener is from out of town, or his favorite station is off the air.)
 - *Promotion*—The consumer takes advantage of cents-off coupons or is attracted to a different product because of an advertising offer. (In radio, your station's outside advertising campaign stimulates a non-listener's interest with a contest or special attraction.)
 - *Price*—A lower price temporarily switches the consumer to a different brand. (In radio, competitive advantages such as a lower commercial load may influence a listener to try your station for a change.)
 - *Package Design*—More attractive packaging leads the consumer to a different choice of brands. (In radio, a different programming philosophy captures the listener's attention.)
 - *Product*—Consumers often make temporary brand changes because they feel an alternative will satisfy their particular needs. (In radio, a listener tunes from one format to another for a change of pace.)
2. **Chance User**—This is the consumer who, by chance, not choice, purchases a product for no other reason than it is the only one available. For example, the consumer buys a brand of soap because it is the only kind in the store. (In radio, the listener may be a passenger in a car pool where the driver controls the dial; or, at work the superior decides the choice of station.)
3. **Non-User**—This consumer will under no circumstances use a particular product, and will not be in a position to be forced to use the product. Think of a five-year-old—this child has no use for an electric razor. (And in radio, a contemporary listener who speaks only English will not listen to a foreign-language station.)

Gaining Some Programming Insight From Your Sales Department

Your Sales Department offers many different advertising plans that are designed to meet specific objectives of advertisers. There are some close parallels between these sales plans and your programming objectives. If you think about programming your station in a similar way, you may achieve certain goals.

Saturation Schedule

A heavy load of commercials aired over a short period of time. Used by an advertiser to make a strong impression for a short-lived event such as a weekend sale.

Programming Parallel

An extraordinarily heavy play of a new release by a very popular artist.

Spectrum Plan

A medium level of commercials distributed equally throughout the broadcast day. It is designed to give product exposure to a great number of different people, but each listener may only hear the commercial one or two times per week. Can be used for consistent advertiser who is reminding listener that he is still around.

Programming Parallel

Playing of a re-current hit, one that was hot on the charts a few weeks ago, is still liked by the listener, but may have already peaked in sales at record stores.

Spot Schedule

A series of commercials aired in one or two day-parts only. The schedule is designed to reach a particular target audience which is most available during that day-part. Can be used for advertisers who are gearing for massive numbers of listeners in that demographic.

Programming Parallel

Programming by day-parts. Gearing your programming to appeal to a particular group of listeners who have a tendency to listen at high levels during certain time periods.

Fixed Position

A commercial placed at the same time every day. Listeners become accustomed to hearing the commercial daily in this time slot. Fixed-position commercials are sometimes associated with particular programs such as a morning sports show or a daily drama program.

Programming Parallel

Airing of a feature vignette at the same time every day as part of an air personality's regular show. As an example, the morning show may air the lunch menu for the public schools for that day.

Summary

Your station will be more successful in answering the needs of its audience through effective marketing, if you:

1. Understand the motivations of each of the three active segments of your audience—the Exclusive Users, the Brand Loyals and the Users.
2. Balance the internal environment, which you control, with the external environment, over which you have less control.
3. Adapt some of the techniques used by the Sales Department to get an advertiser's message across.

SECTION TWO

**Definitions of Basic
Research Terms and
Solving Programming Problems
Using The Arbitron Radio
Market Report**

Some Basic Definitions

All estimates in Arbitron reports may be divided into two broad categories,

Average Estimates
and
Cume Estimates.

Averages are always an estimate of listening that is taking place in any quarter-hour of a given day-part.

Cumes are always an estimate of different persons that listened for at least five minutes during a given day-part.

Think of customers in a shoe store. In any given 15-minute period, there may be four customers in the store (Averages).

During the course of the store's business week, 500 different customers may pass through the store (Cumes).

Averages are expressed in **five** different ways.

1. *Average Persons.* An estimate of the average number of people who are listening to a station during any quarter-hour of a day-part.
2. *Average Ratings.* An Average Persons estimate expressed as a percentage of the population
3. *Metro Totals.* The sum of all the Average Persons estimates of listening to all radio in any quarter-hour of a day-part.
4. *Away-From-Home.* An estimate of the Average Persons listening to a station during any quarter-hour of a day-part, while the listeners are not at home. These estimates are also expressed as a percent of all the average listening (both at-home and away-from-home) for the station.
5. *Metro Shares.* An estimate of a station's Average Persons listening expressed as a percent of all listening to radio (Metro Totals) in any quarter-hour of a given day-part.

Cumes are expressed in **four** different ways.

1. *Cume Persons.* An estimate of the number of *different* people who listen to a station for at least five minutes sometime during a given day-part.
2. *Cume Ratings.* A Cume Persons estimate expressed as a percentage of the population.
3. *Metro Totals.* An estimate of the sum of all the *different* number persons listening to radio for at least five minutes sometime during a day-part.
4. *Exclusive Cumes.* An estimate of the number of *different* persons that listen at least once for five minutes to a given station *and to no other station* during the day-part.

Summary of Estimates in Arbitron Radio Market Reports

	<u>Average</u>	<u>Cume</u>
Persons	Yes	Yes
Rating	Yes	Yes
Metro Totals	Yes	Yes
Metro Shares	Yes	No
Away-From-Home	Yes	No
Exclusive	No	Yes

Descriptions of how Average and Cume estimates are produced are found in Section Three.

Checklist for Reviewing a Report

The average Arbitron Radio Market Report is filled with over 100,000 estimates and can present an analysis problem to even the most experienced user. The question is, what do you look at first? What comparisons can you quickly make that will give you a better understanding of whether or not you are on target? For a general sketch of how the report looks from a programming standpoint, we recommend you follow our Checklist for Reviewing a Report.

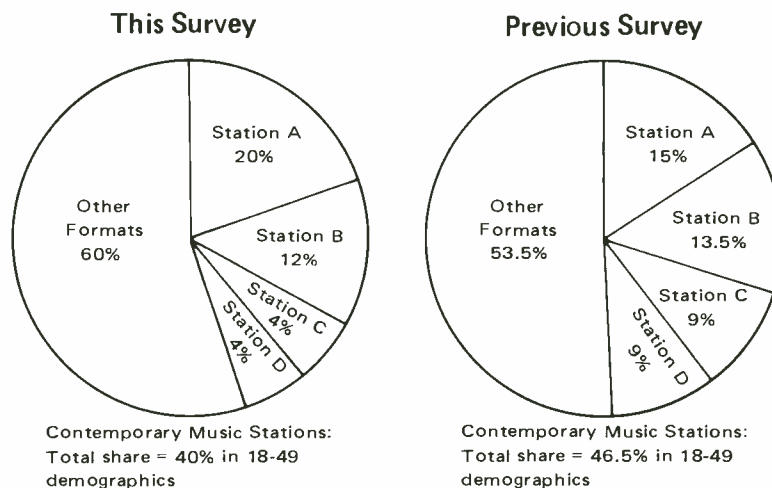
Checklist

1. Check your station's trends in the Trend section of the report. While you are at it, you can spot check the trends of your competitors.
2. How did the whole market listen overall?
 - Compare Metro Totals at the bottom of each Trends Page to see the pattern of Average Quarter-Hour listening. Is it up or down from the last book? What was it a year ago? Is there a seasonal trend?
 - Compare Metro Cume Rating Totals for the Monday-Sunday, 6AM-Midnight day-part found on the first page of the "DAY-PART AVG + CUME" section.

How do these Cume Ratings compare with the last report and a year ago?

Put both the Average Ratings and Cume Ratings side by side. Is Average listening up and Cume listening about the same? If so, that means *longer* time spent listening. Is Average listening down and Cume listening up? That means *less* time spent listening.

3. Use the previous survey plus the survey of a year ago. Look at the five major day-parts (Monday-Sunday 6AM-Midnight, Monday-Friday 6-10AM, Monday-Friday 10AM-3PM, Monday-Friday 3-7PM, Monday-Friday 7PM-Midnight).
 - Add the total shares for stations with a format similar to that of your own. Who has the biggest piece of the pie? You can do this by demographic group, too!



4. How have your Exclusive Cumes changed? Compare this report with the last report, and with that of a year ago.
5. What is the trend of your Away-From-Home listening? Compare your station with your competition.

Now that you have an idea of what your trends look like, you can go to work on particular problem solving.

Solving Programming Problems Using the Market Report

In addition to looking at audience estimates for your station for a certain day-part, many programmers like you gain additional insight into their station's problems by doing some very simple calculations.

This section describes these problems and provides a method of answering certain questions about programming performance.

Each problem is laid out in six parts:

1. The question
2. How to make the calculation to get the answer
3. Formula
4. Example
5. Result
6. Additional applications of the calculation

Problem 1

Question: How much time does the average person listen to my station?

Answer: Calculate Average Time Spent Listening (TSL)

Formula:
$$\text{TSL} = \frac{\text{Avg. Audience} \times \# \text{ Qtr. Hours in Day-part}^*}{\text{Cume Audience}}$$

*Note: See page 48 for table listing number of quarter-hours in various day-parts

Example: Station A, Monday-Sunday, 6AM-Midnight
Total Survey Area, Total Persons 12+
Average Audience 16,700
Cume Audience 201,400
¼ hrs. in Day-part 504
(18 hrs./day × 7 days × 4 quarters per hour)

$$\text{TSL} = \frac{16,700 \times 504}{201,400} = 41.8 \text{ quarter hours}$$

Result: The average person 12+ in the Total Survey Area spends 41.8 quarter hours listening to Station A during the day-part, Monday-Sunday, 6AM-Midnight

Note: For a station that is on the air less than the full day-part (e.g., daytime station) reduce the number of quarter-hours in the formula to the actual number the station is on the air.

- Applications:**
- a. Compare your station's TSL with those of other stations with the same format.
 - b. Construct a market average by calculating TSL for each listed station and taking an average of the averages.
 - c. Chart your station's TSL through the four major day-parts (Monday-Friday, 6-10AM, 10AM-3PM, 3-7PM, 7PM-Midnight).

Problem 2

Question: Am I doing a good job for reaching my target audience?

Answer: Compare the Time Spent Listening of your target audience with that of your total audience to measure the Efficiency of your Target Audience. (ETA)

Formula: $ETA = \frac{\text{Target Audience Time Spent Listening}}{\text{Total Audience Time Spent Listening}}$

Example: Station A, Monday-Sunday 6AM-Midnight, Total Survey Area, Target Audience is Adults 25-49.

	<u>Avg. Persons</u>	<u>Cume Persons</u>
Adults 25-49	12,400	132,600
Total Persons 12+	16,700	201,400

Step One: Calculate Time Spent Listening for each group (See TSL page 17 for detailed procedure)

$$\text{Adults 25-49 TSL} = \frac{12,400 \times 504}{132,600} = 47.1 \frac{1}{4} \text{ hrs.}$$

$$\text{Total Persons 12+ TSL} = \frac{16,700 \times 504}{201,400} = 41.8 \frac{1}{4} \text{ hrs.}$$

Step Two: Calculate Efficiency of Target Audience

$$ETA = \frac{\text{Target Audience TSL}}{\text{Total Audience TSL}} = \frac{47.1}{41.8} = 1.13 \text{ ETA}$$

Result: The target audience of Adults 25-49 listens a greater amount of time to the station than the total audience. The target audience is more efficient than the total audience.

- Applications:**
- Determine which target audience or individual age/sex cell is most efficient on your station.
 - Compare different day-parts to see when your ETA is greatest.
 - Compare your station's ETA with that of similarly programmed stations in your market.

Problem 3

Question: How many different groups of people contribute to my station's average audience?

Answer: Calculate the station's Turn Over Ratio (T/O)

Formula: Turn Over Ratio (T/O) = $\frac{\text{Cume Audience}}{\text{Avg. Audience}}$

Example: Station A, Total Persons 12+, Total Survey Area, Monday-Sunday, 6AM-Midnight

Average Audience 16,700

Cume Audience 201,400

Turn Over Ratio = $\frac{201,400}{16,700} = 12.1$ to 1

Result: Approximately 12 different groups of people tune in to my station during the course of the broadcast week (Monday-Sunday, 6AM-Midnight) to make up my station's average audience.

Applications:

- Compare your station's Turn Over rate with that of other stations in the market.
- Determine which age/sex group turns over the least on your station (The lower the T/O, the longer the group listens to your station.)
- Compare the T/O of your station in various day-parts.

Problem 4

Question: What percent of the listeners in one of my time periods also listens to my station in another time period?

Answer: Calculate the Percent Recycling of your audience.

Formula: Percent Recycling = $\frac{\text{Cume Audience that listens to both of two time periods}}{\text{Cume Audience that listens to one of the time periods}}$

Example: Station A, Metro Survey Area, Total Persons 12+

Cume Audience, Mon-Fri, 6-10AM	18,400
Cume Audience, Mon-Fri, 10AM-3PM	14,100
Cume Audience, Mon-Fri, 6AM-3PM*	25,500

*Note: Estimate for this day-part, which encompasses the two other day-parts, is one of several that are to be found in the Cume Estimates for Day-part Combinations section of the market report.

Step One: Calculate the Cume Audience that listens to both day-parts:

Cume 6-10AM	18,400
+Cume 10AM-3PM	14,100
	<u>32,500</u>
-Cume 6AM-3PM*	25,500
Cume that listens to both day-parts	<u>7,000</u>

*Note: If all the persons that listened in the first day-part did not listen to the second day-part, and if all the persons that listened in the second day-part did not listen in the first day-part, then the Cume Estimate for the combined day-part would be the addition of the two day-part Cumes (32,500). The actual estimate for the combined day-part is less (25,500) and the difference between the two represents those people that listened to both day-parts (7,000).

Step Two: Calculate the percent of listeners that recycle from the first day-part into the second day-part.

$$\text{Recycling} = \frac{\text{Cume Audience that listens to both of two time periods}}{\text{Cume Audience that listens to one of the time periods}} = \frac{7,000}{18,400} = 38\%$$

Result: Of the 18,400 Cume Audience that listens Monday-Friday from 6-10AM, 7,000 or 38% *also* listen Monday-Friday from 10AM-3PM. A total of 38% of the station's morning listeners recycle into mid-day.

- Applications:**
- Determine the percent of your audience that recycles from Monday-Friday, 6AM-Midnight to the Weekend, 6AM-Midnight.
 - Calculate the audience that listens *only* to one of two time periods (total Cume of one day-part minus those that listen to both day-parts).
 - Compare the recycling of your target audience with that of your total audience.
 - Compare recycling of your station's listeners with that of other stations in the market.

Problem 5

Question: During which hours of the day does my station do the best job in reaching listeners?

Answer: Chart the station's Hour-by-Hour Average and Share of Audience Index.

Formula: Hour-by-Hour Index = $\frac{\text{Mon-Fri Hour-by-Hour Audience or Share}}{\text{Mon-Fri 6AM-Mid. Audience or Share}}$

Example: Station A, Metro Survey Area, Total Persons 12+

	<u>Avg. Audience</u>	<u>Share</u>
Mon-Fri, 6AM-Midnight	16,700	9.4
Mon-Fri, 1-2PM	15,600	11.2

To calculate the Index for 1 PM to 2 PM

$$\text{Avg. Index} = \frac{\text{Mon-Fri 1-2PM Audience}}{\text{Mon-Fri 6AM-Mid Audience}} = \frac{15,600}{16,700} = .93$$

$$\text{Share Index} = \frac{\text{Mon-Fri 1-2PM Share}}{\text{Mon-Fri 6AM-Mid Share}} = \frac{11.2}{9.4} = 1.19$$

Result: For the hour Monday-Friday 1-2PM, the station's Average Audience Index was below 1.0. Its Average Audience was less than the Average Audience Monday-Friday, 6AM-Midnight.

For the same hour, the station's Share Index was greater than 1.0. Its Share was greater than the Share Monday-Friday, 6AM-Midnight.

Applications: a. Track the station's Average and Share Indexes throughout the broadcast day:

	<u>Avg. Audience</u>	<u>Avg. Index</u>	<u>Share</u>	<u>Share Index</u>
Monday-Friday 6AM-Mid	16,700	1.00	9.4	1.00
Monday-Friday 6-7AM	10,600	.63	9.7	1.03
Monday-Friday 7-8AM	18,400	1.10	6.7	.71
Monday-Friday 8-9AM	17,500	1.05	8.9	.95
Monday-Friday 1-2PM	15,600	.93	11.2	1.19
Monday-Friday 2-3PM	16,400	.98	10.8	1.15
Monday-Friday 3-4PM	17,800	1.07	9.7	1.03
Monday-Friday 7-8PM	11,800	.71	10.8	1.15
Monday-Friday 8-9PM	10,600	.63	9.6	1.02
Monday-Friday 9-10PM	9,700	.58	9.8	1.04

b. Compare the station's Average and Share Index with those of other stations in the market.

c. Compare the station's Index of Men with Women.

Problem 6

Question: How much of my audience listens only to me and to no other station?

Answer: Calculate the percent of your Cume Audience that is exclusive.

Formula: Percent Exclusive = $\frac{\text{Station's Exclusive Cume}}{\text{Station's Total Cume}}$

Example: Station A, Adults 18+, Monday-Friday, 6-10AM, Metro Survey Area.

Station's Exclusive Cume Estimate	18,400
Station's Total Cume Estimate	34,100

Percent Exclusive = $\frac{\text{Station's Exclusive Cume}}{\text{Station's Total Cume}} = \frac{18,400}{34,100} = 54.0\%$

Result: Of the 34,100 different Adults 18+ that listen to my station at least five minutes during morning drive, 18,400 or 54% listen to my station exclusively. These listeners cannot be found on any other station during that time period.

- Applications:**
- Compare your station's percent Exclusive Cume with those of similarly formatted stations in the market.
 - Chart your station's percent Exclusive Cume over the four major day-parts.
 - Check the difference in Percent Exclusive Cume between Men 18+ and Women 18+ on your station.

Problem 7

Question: Is my station ahead of or behind the market average of Away-From-Home listening?

Answer: Create an Away-From-Home Listening Index for your station.

Formula: Away from Home (AFH) Listening Index =

$$\frac{\text{Your station's \% Away-From-Home Listening}}{\text{The market's \% Away-From-Home Listening}}$$

Example: Station A, Men 18+, Monday-Friday, 10AM-3PM

Station A Away-From-Home Listening %	53
Market Average Away-From-Home Listening %	48

$$\text{AFH Listening Index} = \frac{\text{Station A AFH Listening \%}}{\text{Market Avg. AFH Listening \%}} = \frac{53}{48} = 1.10$$

Result: A greater percent of the station's Men 18+ Average Audience listens Away-From-Home than does the market in general.

- Applications:**
- Calculate the Away-From-Home Listening Index of similarly formatted stations.
 - Determine if there is a difference between the AM and FM bands.
 - Compare the AFH Listening Index of your station during different day-parts.

Problem 8

Question: Which are the most available audiences during certain times of the day?

Answer: Chart the demographic share of audience hour-by-hour.

Formula: Hour-by-Hour Demographic Share = $\frac{\text{Target Audience}}{\text{Total 12+Audience}}$

Example: Average Listening, Metro Survey Area
Monday-Friday, 1-2PM

Total Listening, Total Persons 12+	138,600
Total Listening, Men 18-34	16,400
Total Listening, Women 25-49	18,700

Men 18-34 Hour-by-Hour Demographic Share =

$$\frac{\text{Total Listening Men 18-34}}{\text{Total Listening Total Persons 12+}} = \frac{16,400}{138,600} = 11.8\%$$

Women 25-49 Hour-by-Hour Demographic Share =

$$\frac{\text{Total Listening Women 25-49}}{\text{Total Listening Total Persons 12+}} = \frac{18,700}{138,600} = 13.5\%$$

Result: In the day-part Monday-Friday, from 1PM to 2PM, there are more Women 25-49 available for listening than Men 18-34.

- Applications:**
- Chart Hour-by-Hour Demographic Share for each hour of the broadcast day, Monday-Friday, 6AM-Midnight. Identify time periods when certain target demographics dominate the listening.
 - Determine which of several similarly formatted stations gets the best share of audience of a target demographic during specific one-hour time periods.
 - Identify hour-by-hour shifts in listening of Men, Women, Teens. Pinpoint hours where programming can shift somewhat to gear to certain target demographics.

Problem 9

Question: How often do my listeners hear the same record?

Answer: Calculate the Reach and Frequency of the record.

Before we go any further, here is a thorough explanation of Reach and Frequency. The formula and calculations for Problem 9 are on page 27.

Programmers have for many years used Time Spent Listening to set their record rotation. Reach and Frequency, a sales tool for showing spot schedule Reach and Average Frequency, is another fine-tuning technique to determine if your rotation is on target.

Reach and Frequency is the process of determining the answers to two questions:

1. How many different people hear the record (advertisement) at least once (Net Reach) during its series of plays on the air?
2. How often does the average listener hear the record (Average Frequency)?

Reach and Frequency has been used for many years by advertisers to estimate the delivery of a specific advertising schedule. The process is necessary to determine the total number of different people that will hear an advertising schedule at least once. That estimate is less than the station's Cume Estimate for the same time period because the advertisement is not on the air constantly. As a result, the commercial may run during periods when some people are not listening, and the commercial will be heard by fewer people than the station's Cume. Once the Reach has been determined, the Frequency can be easily calculated.

Most Reach and Frequency formulas used for evaluation of radio advertising schedules are models or mathematical simulations. Reach, when calculated on the models, uses probability analysis to determine an estimated audience size. Arbitron has a computer system which calculates Reach and Frequency by analyzing raw diaries to estimate audience delivery of specific advertising schedules, or in this case, record rotations.

To demonstrate the programming applications of Reach and Frequency, here are the results of two actual record rotations which were analyzed on the Arbitron system. One had a high rotation of 15 plays per week; the other had a low rotation of eight plays per week. (The terms "high" and "low" are both relative to the particular station which was examined.)

Problem 9 *(Continued)*

Record Impact Estimates

High Rotation Record

<u>Day-Part</u>	<u>Station's Cume (From Report)</u>	<u>Number of Record Plays</u>	<u>Record's Reach</u>	<u>% of Station's Cume That Hears Record</u>	<u>Record's Average Frequency</u>
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Mon-Sun, 6AM-Midnight	263,500	15	148,400	56.0	1.74
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Mon-Sat, 6-10AM	150,200	4	52,500	35.0	1.32
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Low Rotation Record

Mon-Sun, 6AM-Midnight	263,500	8	88,900	33.7	1.40
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Mon-Sat, 6-10AM	150,200	1	12,500	8.3	1.00
--------------------	---------	---	--------	-----	------

The chart shows the High Rotation Record was played 15 times during the week (Mon-Sun, 6AM-Midnight), and was heard by 148,400 different people (Reach), which is 56% of the station's total Cume. The record was heard an average of 1.74 times (Frequency) by each listener.

We have only shown the impact on two day-parts for the sake of brevity. Naturally, any and all day-parts may be examined.

Arbitron subscribers now have the capability of making these Reach and Frequency runs instantly with Radio AID . . . an on-line computer system linked with the actual raw diary data. This system allows you to tabulate instantly the actual Reach and Frequency of different record rotations.

Reach and Frequency of record rotations should prove to be an important tool when designing record rotations.

Problem 9 (Continued)

Question: How often do my listeners hear the same record?

Answer: Calculate the Reach and Frequency of the record rotation.

Formula:
$$\text{Frequency} = \frac{\text{Number of times record is played} \times \text{Avg. Audience}}{\text{Net Reach}^* \text{ of the record schedule}}$$

*Note: Net Reach must be calculated using a Reach and Frequency System.

Example: Station A, Total Persons 12+, Metro Survey Area
Monday-Sunday, 6AM-Midnight

Average Audience	13,600
Cume Audience	243,400
Number of times record is played:	24

Step One: Calculate Net Reach* of record schedule

*Note: Net Reach can be calculated using standard models or ordering a Radio AID run from Arbitron.

Net Reach = 57.7% of Cume Audience or 135,600 Total Persons 12+

Step Two: Calculate Average Frequency of the Record schedule.

$$\text{Avg. Frequency} = \frac{\# \text{ of times record is played (24)} \times \text{Avg. Audience (13,600)}}{\text{Net Reach of record schedule (135,600)}} = 2.41$$

Result: A record played 24 times per week on Station A during the broadcast week (Mon-Sun, 6AM-Midnight) will be heard at least once by 135,600 different listeners. The average* number of times a listener will hear the record is 2.41.

*Note: Since the radio station listenership is made up of heavy listeners, medium listeners and light listeners, some people will hear the record many more times than 2.41, and others will hear it fewer than 2.41. The average listener will hear it 2.41 times.

- Applications:**
- Compare the Reach and Frequency of a high rotation and low rotation record on the station during the total week.
 - Calculate the Reach and Frequency of record rotations within individual day-parts (e.g., morning drive).
 - Compare the Reach and Frequency of your station's record rotation with that of similarly formatted stations in the market.
 - Determine if your men listeners hear records as often as your women listeners.

SECTION THREE

**How Arbitron Measures Radio
and How to Calculate the
Reliability of the Estimates**

How Arbitron Measures Radio

There are many research measurement techniques which are used to gather data. Arbitron Radio has developed the current Personal Diary method of measurement after investing millions of dollars in research and testing.

Each year, Arbitron retests its current methods and experiments with new techniques that may be used to replace those in existence. This constant testing assures you, the user, that Arbitron is always using the best and most practical techniques available.

Many questions are asked about how Arbitron measures radio and also about how reliable the ratings are. An overview description of our measurement techniques follows.

DEFINING THE GEOGRAPHY THAT IS TO BE MEASURED

Three different factors govern the geography that Arbitron measures for radio.

Metro Survey Areas generally correspond to Standard Metropolitan Statistical Areas (SMSA's) or Standard Consolidated Statistical Areas (SCSA's) as defined by the U.S. government's Office of Management and Budget subject to exceptions dictated by historical industry usage and other marketing considerations. The SCSA is a larger area which always encompasses a smaller SMSA and is implemented by Arbitron only upon agreement among subscribing stations within the market.*

Total Survey Area (TSA). The Total Survey Area consists of all Metro counties plus all other counties in which there is significant listening to stations located in the Metro. Counties in the TSA, but outside the Metro are called non-Metro counties.

When a market is measured for the first time, Arbitron uses 0.5MV/M signal contours of the market's AM and FM radio stations in conjunction with station performance in surrounding counties to establish the non-Metro. With the contour maps in place, Arbitron looks for counties in which 10% of the Cume listenership is to the stations home to the Metro being measured. Any county which meets this listenership level becomes part of the Total Survey Area. Exception: If a county which is in the Metro of another Arbitron measured market is contiguous to the Metro of the market being examined, the requirement for Cume listenership is 5% rather than 10%.

Arbitron updates its Total Survey Areas once a year, in April, based on listenership during the past two Spring surveys, and the past Fall survey, in those markets where a Fall survey was conducted.

*In New England, SMSA's are defined on a "town" rather than a county basis. Where the SMSA represents 65% or more of the SRDS full-county definition for the market, Arbitron uses the SRDS full-county definition to define the Metro Survey Area; where the SMSA represents less than 65% of the population of the SRDS full-county definition for the market, Arbitron uses the SMSA to define the Metro Survey Area.

Arbitron's ADI (Area of Dominant Influence). ADI's are Arbitron Television's geographic market design which defines each television market, exclusive of others, based on measurable viewing patterns. Every county in the United States (excluding Hawaii and the portions of Alaska outside of the Anchorage ADI) is allocated exclusively to one ADI.

In addition to radio and television, other media, including newspapers, magazines and outdoor, provide estimates of audience delivery based on Arbitron's ADI's. Listening estimates in ADI's give radio an equal opportunity to compete for advertising dollars.

HOW MUCH SAMPLE SHOULD THERE BE?

All surveys are based on taking a sample and projecting the results to the total universe. A blood test requires a small sample of blood, not the entire supply in the body. A properly drawn sample, even if it does appear to be small, can be very representative of the universe, just as a blood sample can.

Market Quotas or diary "in-tab objectives" are established for a market's Metro and non-Metro area based largely on the population of the market. Other factors such as FCC revenues for the market (an indication of the market's ability to support higher sample costs), numbers of stations, and geographic size also come into play in determining an objective in-tab sample.

Arbitron currently has seven market classifications and seven different in-tab objectives. The letter designations below signify the size of the market and the number indicates the frequency of surveys per year.

<u>Classification</u>	<u>Survey Frequency</u>	<u># of Markets</u>	<u>Type Market</u>	<u>Metro Objective</u>	<u>TSA Objective</u>
A	4	8	Top 8	1500-3000	1900-3500
A	3	3	large	1200	1600
A	2	20	large	1200	1600
B	2	33	medium	700	900
B	1	10	medium	575	700
C	2	8	small	450	550
C	1	80	small	450	550

SAMPLE ALLOCATION

Allocation of sample among Metro counties is based on each county's percentage of total Metro population. The Metro receives a larger sample in order to project estimates for individual age/sex cells for each reported station. The non-Metro's sample size is for the purpose of adding listening estimates in these areas to the stations' estimates in the Metro.

Here is an allocation example:

Market: Your City, U.S.A.

<u>Area</u>	<u>12+ Population</u>	<u>Quota</u>
Metro	100,000	475
Non-Metro	20,000	75
Total Survey Area	120,000	550

<u>Metro Area</u>	<u>12+ Population</u>	<u>% of Total Metro Pop.</u>	<u>County Objective</u>
County A	73,700	73.7%	350
County B	26,300	26.3%	125
Metro Total	100,000	100.0%	475

<u>Non-Metro Area</u>	<u>12+ Population</u>	<u>% of Non-Metro Pop.</u>	<u>County Objective</u>
County C	1,000	5	4
County D	6,000	30	23
County E	4,000	20	15
County F	6,000	30	23
County G	3,000	15	11
Non-Metro Total	20,000	100	76

Non-Metro sample allocation is usually more complicated than the above example. If the population in the non-Metro is relatively high in comparison to the Metro population, there may be higher objective in-tab quotas.

PLACEMENT RATES

The number of diaries placed is calculated based on Arbitron's experience in each county in getting back complete, usable diaries. Each county's agree rate, average household size, return rate and usability rate are taken into consideration to determine how many diaries should be placed to get back the proper number of "in-tab" diaries.

Example:

Market: Your City, U.S.A.

<u>County</u>	<u>In-Tab Diaries Required</u>	<u>÷</u>	<u>% of Usable In-Tab Diaries of Those Originally Mailed</u>	<u>=</u>	<u>Diaries Mailed</u>	<u>÷</u>	<u>Persons per Household among consenting Households</u>	<u>÷</u>	<u>% of Households that consent to Participate</u>	<u>÷</u>	<u>% of Originally Designated Households in which Telephone was Answered</u>	<u>=</u>	<u>Household Listings Ordered</u>
X	175	÷	60%	=	292	÷	2.4	÷	81%	÷	87%	=	173
Y	131	÷	61%	=	215	÷	2.2	÷	87%	÷	90%	=	125

The number of household listings to be ordered is adjusted after each survey in order to compensate for over-or under-response rates.

Example:

Your City, U.S.A.
Metro Market Quota or objective: 475

	<u>In-Tab Quota</u>	<u>Actual In-Tab This Survey</u>	<u>Actual In-Tab Last Survey</u>	<u>Actual In-Tab 2 Surveys Ago</u>
Metro County A	350	400	390	388
Metro County B	<u>125</u>	<u>130</u>	<u>127</u>	<u>125</u>
Metro	475	530	517	513

In this example, County A is returning more diaries than the quota. The number of household listings may be adjusted downward. Response in County B is on target, and there will be no adjustment.

DRAWING THE HOUSEHOLDS THAT WILL BE IN THE SAMPLE

Sample quotas are recorded on a computerized tape which goes to Metro Mail Corporation, the nation's leading supplier of listed telephone households. Metro Mail then uses a sophisticated sample selection program developed by *Arbitron* to choose those households which will be asked to participate in the survey. It is virtually impossible to exactly duplicate the Arbitron-selected sample households.

The sample selection system works as follows:

Listed telephones in each county are sorted into order by ZIP Code. Business numbers are removed from the list. The computer counts the number of listings in each county and divides this number by the quota for the county in order to create an "interval". Within each interval, the computer generates a random number which corresponds to a household within that interval. That household becomes part of what is called the "designated sample".

Example:

	<u>Households Needed</u>	<u>Listed Telephone Households</u>	<u>Interval</u>
County A	121	25,400	210

<i>County A</i>				
<u>ZIP</u>	<u>Names</u>	<u>Interval</u>		
0001	selected #67	} 210 households		
	0002		selected #185	} 210 households
0003		selected #103	} 210 households	
	0004	selected #34		} 210 households
0004		selected #86	} 210 households	
	0004	selected #101		} 210 households

Household randomly selected within each interval of 210 households

The computer, in this example, will count down 210 telephone listings and then generate a random number between 1 and 210. The number, let us say 67, signifies the residential listing to be included. A new *random number* is selected for each interval.

By design the sample selection system is geographically dispersed by ZIP Code.

ARBITRON'S EXPANDED SAMPLE FRAME

Arbitron's Expanded Sample Frame (ESF) is a Universe which consists of Unlisted Telephone Households. ESF is used in addition to normal sampling procedures in some Arbitron Metros.

What is an unlisted telephone household?

Unlisted telephone households are telephone households which do not appear in the current telephone directory. They are households which have requested their telephone number not to be listed and they are households where the assigned telephone number did not get listed in the directory because of the date of installation and the date of telephone directory publication. These two types of unlisted telephone households have been labeled unlisted by choice and unlisted by chance. Arbitron's procedures reach both types of households.

Identifying "unlisted telephone households"

An analysis is made of listed telephone numbers to locate those numbers which tend to be unlisted. Using a computer, and the published telephone directory showing all listed telephone households, an analysis is made of all telephone exchanges which contain residential telephone listings. For this analysis, a telephone exchange is defined as the first five digits of the seven digit telephone number. For example, PA5-1234 is a listed household in the PA5-12XX exchange. All exchanges which contain five or more listings are considered for ESF sampling.

The computer identifies all 100 numbers in the PA5-12XX exchange (PA5-1200—PA5-1299). The telephone directory provides all listed numbers which are then deleted from the 100 numbers in the computer's memory. This deletion provides a group of remaining numbers which are unlisted or not assigned. The computer saves all of the "remaining" numbers for all residential exchanges in the metropolitan area. A systematic random sample is then drawn from the "remaining numbers". This provides all the numbers to be dialed for a given ESF metropolitan area sample. Where known, all commercial telephone numbers are deleted along with the telephone banks used for pay phones.

GETTING HOUSEHOLDS TO PARTICIPATE (AREAS NOT ETHNICALLY CONTROLLED)

The listed telephone households are sent a letter telling them of their selection. The letter is followed by a call from one of Arbitron's 1,600 field interviewers who asks for their participation. (The first contact for residents in unlisted telephone households is the phone call.) If the household agrees, and more than 80% do, then the interviewer asks the number of individuals residing there who are 12 years or older. Diaries for each individual are mailed in time to arrive one or two days before the start of the week the household is to participate in the survey. Each survey week begins on a Thursday and ends the following Wednesday. No household participates more than one week. The Arbitron interviewer calls the household just prior to the beginning of the survey and answers any questions the household may have about participating. In the middle of the survey week the Arbitron interviewer calls the household to confirm that the diaries have been received and are being filled out. The interviewer also reminds the household to return their diaries at the week's end. These calls are part of a comprehensive diary security program designed to ensure the integrity of the sample and the estimates that are produced. As an incentive to get good response rates, premiums varying from 25¢ to \$2.00 are enclosed with each diary.

ARBITRON'S ETHNIC MEASUREMENT

The 1970 Census under-represented millions of Blacks and Spanish-speaking people. If this can happen in a government-managed Census that is supposed to account for all persons in the United States, then it can happen in a sample of the general population taken by an audience measurement company that is measuring radio listening.

Recognizing this possibility, Arbitron Radio has done something about it:

1. Special Interviewing Procedures in High Density Ethnic Areas
2. Identification of the Race/Nationality of Respondents
3. Weighting Audience Estimates by Race

Special Interviewing Procedures in High Density Ethnic Areas

Purpose

The important objective in measuring listening among Blacks and Spanish-speaking people is to (1) find them and (2) get them into the tabulated sample. In order to meet this objective, Arbitron Radio uses special interviewing procedures in High Density Black and Spanish Areas. Use of these procedures has resulted in a significant improvement in the response rate from people living in these areas and has resulted in a better representation of Black and Spanish-speaking persons in the tabulated sample.

Selection of Metros for Ethnic Measurement Procedures

The criteria for selecting the markets in which to implement special ethnic interviewing techniques are:

- a. Metros with 20% or more Black or Spanish population;
- b. Metros with station(s) programming 50% or more to Black or Spanish audiences can qualify if they have 15% or more Black or Spanish population.

In selecting Metros, these criteria apply to each population group separately. That is, one does not add the Black population to the Spanish population to determine if there is 20% penetration.

When special interviewing began in 1967, the criteria above were not established as policy. Markets in which ethnic interviewing was done prior to 1970 continue to have these special techniques even though they may not meet the present criteria.

Using these selection criteria, Arbitron now conducts special ethnic interviewing techniques in more than 60 radio Metros.

Selection of High Density Ethnic Control Areas within Metros

The high density ethnic control area is essentially a geographic area. When a market qualifies for ethnic measurement, each qualifying county within the Metro area is examined on the basis of Census tracts. The Census tracts are combined into ZIP Codes. If a ZIP Code contains 35% or more Black or Spanish population, that ZIP Code area is designated as a control area in which the special interviewing techniques will be conducted. Usually, there are several ZIP Code areas which form the control area of each Metro in which ethnic measurement is done.

The specific requirements that these ZIP Code areas must meet are as follows:

- a. They must be within a county containing 15% or more Black or Spanish population; and
- b. They must contain 35% or more Black or Spanish population; and
- c. The cumulative Black or Spanish penetration across ZIP Codes or Census tracts within ZIP Codes must equal 10% or more of the Metro in-tab objective or 60 diaries, whichever is less.

Once a part of a county, or counties, is designated as a high density control area, this area is treated as a separate county. The results of interviewing from within this control area are projected only to the people living within the control area the same as results would be projected for a separate Metro county.

Special Interviewing Procedures in Black Community Areas

The telephone is used as a data retrieval procedure within High Density Black Areas selected on the basis of the penetration of the Black population. Interviews are conducted with persons age 12 and older in sample households over a seven-day period.

The Arbitron interviewer makes an initial call and finds a time convenient to household members when she may call on a regular daily basis. She then interviews each household member, 12 and older, on a daily basis and records the results in a separate diary designated for each family member. In other words, the interviewer keeps the diary for the respondent and fills it out based on the information obtained in daily telephone calls. This procedure is followed for all households, irrespective of their race/nationality characteristics, in the High Density Black Areas.

Arbitron respondents to the the telephone retrieval procedure are told **before** they listen that they are going to be asked about their listening at some time in the future. There is no attempt to ask persons, without any advance warning, about what radio stations they listened to in the previous 24 hours. People who are told in advance that they are going to be asked about their listening, can remember it better than people who were never warned ahead of time.

The telephone retrieval procedure is conducted daily over a seven-day period. There is no attempt to ask people what they listened to seven days ago. People who are contacted daily about their listening can be more accurate in telling what they did than people who are asked to remember—on a total recall basis without advance warning—what they did seven days ago.

In research conducted by Arbitron outside of High Density Black Areas, it was noted that response rate among Blacks, when interviewed using the standard diary procedure, was lower than those among non-Blacks. In other words, Blacks from outside of High Density Black Areas were responding at a somewhat lower rate than non-Blacks.

In order to do something about this, Arbitron extended the telephone retrieval procedure to include all Blacks living within the Metro area irrespective of whether or not they lived inside or outside of High Density Black Areas. This procedure is now being used in all metropolitan areas in which any kind of telephone retrieval procedure is used for High Density Black Areas.

Special Interviewing Techniques in Spanish Community Areas

Within those control areas selected on the basis of Spanish population, the technique used is personal placement, personal follow-up, and personal pick-up. People in sample households are given bi-lingual diaries by bi-lingual interviewers. These diaries are personally delivered to the household

prior to the start of the survey and reviewed with the family members. During the middle of the survey week, another personal visit is made to the household to encourage continuation in the survey and to answer any new questions respondents may have. At the conclusion of the survey, the diaries are personally picked up.

Processing Ethnic Diaries

Diaries obtained through the special telephone and personal placement retrieval methods are edited and processed along with those diaries which were placed by telephone in non-ethnic areas and which were returned by mail. The same careful editing and processing control procedures applied to non-ethnic diaries is used to process the ethnic diaries. The population estimates used for projection purposes are based on updated 1970 Census data provided by Market Statistics, Inc.

Identification of the Race/Nationality of Respondents

In 1972, Arbitron Radio conducted considerable testing to determine the best way of obtaining race/nationality characteristics from respondents. After much experimentation, it was determined that the best procedure for obtaining race/nationality information was at the time of the diary placement in the placement interview.

Beginning with the April/May 1973 survey, the following question was asked in all Metro areas in which any kind of telephone or personal retrieval procedures were used:

"Arbitron designed this survey to measure all segments of the population. Would you please tell me how you describe your family? Is it Cuban, Mexican/American, Puerto Rican, Other Spanish, American Indian, Black, Oriental, White or Other?"
(INTERVIEWER: CHECK APPROPRIATE BOX BELOW.)

- | | |
|---|---|
| <input type="checkbox"/> CUBAN | <input type="checkbox"/> AMERICAN INDIAN |
| <input type="checkbox"/> MEXICAN/AMERICAN | <input type="checkbox"/> BLACK |
| <input type="checkbox"/> PUERTO RICAN | <input type="checkbox"/> ORIENTAL |
| <input type="checkbox"/> OTHER SPANISH | <input type="checkbox"/> WHITE |
| | <input type="checkbox"/> OTHER _____
<i>(Please specify)</i> |

The question above was validated in several markets through face-to-face interviews of respondents who had previously given their race/nationality characteristic on the telephone.

Identification of the race/nationality of respondents will continue in every Metro area in which Arbitron has any kind of telephone or personal retrieval procedures. The question is asked of **all households** in the Metro, not just those households which fall within the High Density Black or Spanish Areas.

PROCESSING THE DIARIES WHEN THEY ARE RETURNED

Diaries are postage paid and are returned directly to Arbitron's Research and Production Center in Beltsville, Maryland. An April/May Sweep measures more than 160 markets plus another hundred or so smaller markets with "ACE" Reports. Over 180,000 different diaries are returned during the April/May survey alone.

The First Diary Check

Diary processing begins with "usability edit." The diary is checked for the following items:

- Postmark is after last day of survey week
- Legibility
- Completeness – entries or no-listening check must appear on each page
- Age/sex filled in – if not, respondent is called
- County written in by respondent matches county code on outside of diary

The Second Diary Check – Crediting Slogans

Diaries containing slogans, frequencies or personality names are sent to special editors. This intermediate step takes place for all diaries requiring special attention. It is here that slogans, frequencies, personalities and multiple station conflicts (i.e., two stations have same slogan, frequency, etc.) are resolved.

Editors, who average 11 years each with Arbitron, check slogans against a master slogan list for the market. This master list is a compilation of facilities forms filled out by each station in the market prior to each survey.

A maximum of three slogans from each station are accepted for use in slogan edit. When two or more stations have the same or nearly the same slogan, set procedures are followed in assigning listening, among them:

1. Assign the slogan based on whether the entry is AM or FM.
2. Assign the slogan to the station whose signal exclusively covers that county (geographic edit).
3. Re-call the diarykeepers in cases where there are more than five diaries mentioning the conflicting slogan.

Entries which name personalities or programs are checked against the program log provided by each station.

If your station carries any sports events, it is also important that you make a note on the Arbitron station log of the team name, e.g., Tigers Football. This way, your station will get credit for any mentions to your station slogan or any sports events you may be covering.

Arbitron uses the following priority in assigning listening:

1. Call letters
2. Frequency
3. Slogan
4. Program
5. Personality

If, for example, a respondent makes the following entry:

95.3 WXXX

. . . although 95.3 is the frequency for Station WAAA, Station WXXX would get the credit. Cases such as these are infrequent and the priority sequence resolves those that do occur.

Final Diary Check

After second diary check is performed, diaries are sent to one of Arbitron’s three data-input mini-computers. These mini-computers perform certain edit checks on the key-to-disc operators’ work which catches many types of errors.

Crediting Aberrated Call Letters

Arbitron’s two huge Control Data 3500 computers collect the data input from the three mini-computers and perform basic logic checks and call letter legality tests prior to the actual market report calculations.

For instance, if station WXXX changed call letters 6 months ago from WYYY, any entries to WYYY would be automatically “flipped” to the new call letters. Periodically, diary keepers entering the old call letters are re-called on a random basis to determine if confusion still exists over the new call letters or if there is confusion with another station.

If an entry is to WXXX-AM and there is no WXXX-AM but a WXXX-FM does exist, credit goes to the FM station automatically and vice-versa.

If a station’s call letters are often aberrated or “confused” by respondents, automatic flips are entered into the computer to correct the respondent confusion.

Examples:	<u>Correct</u>	<u>Actual Entry</u>
	WBER	WVER (sounds like V to respondent)
	WLVE	WIVE (L is written as I)
	WBER	WBRE (transposed call letters)

In addition, the Arbitron Radio Department examines every set of call letters when processing a report in an attempt to assign aberrated letters to the proper station.

WEIGHTING

Weighting the sample can best be described as projecting the sample to represent the population.

All these projections require a basic statistical assumption, that a sample can represent the universe.

In its simplest form here is how it works:

<i>COUNTY “A”</i>	
	<i>18-24 Men</i>
Population	30,000
In-Tab	15
Value of each diary - Persons	
Per Diary Value (PPDV)	2,000

This simple cell weighting example shows us that, in the male 18-24 demographic group in County "A", each diary represents the listening behavior of 2,000 Men 18-24. Arbitron weights its sample by using a Sample Balancing Technique developed by the well-known statistician W. Edwards Deming. Sample balancing adjusts simple cell weighting where necessary in order to compensate for disproportionate returns from certain sex/age cells.

HOW A STATION MAKES THE REPORT
(Minimum Reporting Standards)

Actual report processing begins with the tallying of unweighted quarter-hours and comes by geographic area, by age/sex cell. The computer scans each diary and adds up all the different diaries in which a given station received listening for at least five minutes during the broadcast week, Monday-Sunday from 6AM to Midnight. These are called diary mentions. After the tally, the computer lists those stations that received a minimum of 10 diary mentions or at least one percent of the Metro quota of in-tab diaries, whichever is higher.

Example: 1,600 Metro Quota
 1% = 16 Minimum diary mentions
 Station A - mentioned in 26 diaries - qualifies
 Station B - mentioned in 14 diaries - does not qualify
 Station C - mentioned in 16 diaries - qualifies

This threshold is the first of two Minimum Reporting Standards (MRS) qualifications.

In the second MRS test, the station's Average Quarter-Hour audience rating must be 0.1, or one tenth of one percent of the Metro for the Total Persons 12+ population for the time the station is on the air during the period Monday-Sunday from 6AM to Midnight.

Example: Metro population is 1,000,000
 one tenth of one percent is 1,000.
 (station must obtain at least a 1,000 average quarter-hour audience estimate for Total persons 12+ in the Metro during the period Monday-Sunday from 6AM to Midnight. The computer actually rounds up a .05 rating to 0.1 rating.)

<u>Station</u>	<u>12+, M-S, 6AM-Mid Metro Average Persons Estimate</u>	<u>Rating</u>
WWWW	20,000	2.0 Qualifies
WXXX	1,000	0.1 Qualifies
WYYY	500	.05 Qualifies (Computer rounds to 0.1)
WZZZ	400	.04 Does not Qualify

CALCULATING LISTENING ESTIMATES—AVERAGE AND CUME

Let's zero in on the listening in one of the 18-24 male diaries from County "A", mentioned earlier.

Our subject, John Doe for this example, listens as follows in the 6-10AM, Monday through Friday day-part.

QH = Quarter-Hours listened 6-10AM

<u>Monday</u>		<u>Tuesday</u>		<u>Wednesday</u>		<u>Thursday</u>		<u>Friday</u>	
<u>Station</u>	<u>QH</u>	<u>Station</u>	<u>QH</u>	<u>Station</u>	<u>QH</u>	<u>Station</u>	<u>QH</u>	<u>Station</u>	<u>QH</u>
WXXX	4	WYYY	8	WZZZ	1	WYYY	8	no	
WYYY	2	WXXX	2	WXXX	4			listening	

Quarter-Hour Totals for the 6-10AM Monday-Friday day-part for John Doe:

<u>Station</u>	<u>Quarter-Hours</u>	<u>X</u>	<u>Diary Value</u>	=	<u>Gross Projected Quarter-Hour Audience</u>
WXXX	10	X	2000	=	20,000
WYYY	18	X	2000	=	36,000
WZZZ	1	X	2000	=	2,000

The gross projected quarter-hour audience is then used to create an Average Quarter-Hour estimate. This is done by dividing the gross projected quarter-hour audience by the total number of quarter-hours in the day-part — 80 (4 quarter-hours per hour X 5 days X 4 hours per day).

The *Average Quarter-Hour* audience listening estimates for the station represent an average of all the quarter-hours in the time period, regardless of whether or not there was listening in some of the quarter-hours.

Example:

John Doe's listening Monday-Friday 6-10AM

<u>Station</u>	<u>Gross Projected Quarter-Hour Audience</u>	<u>÷</u>	<u>Total Quarter-Hours in 6-10AM Time Period</u>	=	<u>Average Quarter-Hour Audience</u>
WXXX	20,000	÷	80	=	250
WYYY	36,000	÷	80	=	450
WZZZ	2,000	÷	80	=	25

The *Average Quarter-Hour* audience is computed for all the diaries in the survey to arrive at the estimates which are printed in the book.

An Analogy

You are a shoe store owner and want to know what the average number of people are in your store during any 15-minute period between 11AM and Noon, your peak period. You set up counters at the entrance and at the exit which are recorded and reset each quarter-hour.

Results

<u>Quarter-Hour</u>	<u>Carryover</u>	<u>IN</u>	<u>Number</u>	<u>OUT</u>
11:00 - 11:15AM	—	16	16	10
11:15 - 11:30AM	6	11	17	12
11:30 - 11:45AM	5	10	15	5
11:45 - Noon	10	6	16	5

Carryovers = those remaining from previous quarter-hour

Number = Carryovers plus those coming in

What is average number of people in store?

$(16 + 17 + 15 + 16) \div 4 = 16$ per average quarter-hour were in the store.

A good way for you to remember Average Quarter-Hour:

The average number of people *in your store* per quarter-hour during the given time period.

The *Cume* estimate for each station in this day-part that was contributed by John Doe's listening is 2,000.

Monday-Friday 6-10AM

<u>Station</u>	<u>Individual Station Cume contributed by John Doe</u>
WXXX	2,000
WYYY	2,000
WZZZ	2,000

Although John Doe's Average Quarter-Hour listening varied between station, his diary value (PPDV) counts only one time for each different station he listened to during the time period. His cumes are then added to others to show the estimates in the Arbitron Report for each station.

Reliability of Ratings

Arbitron estimates are subject to statistical variance (sampling error) associated with all surveys using a sample of the universe. They are also subject to a non-sampling error.

The statistical measure of sampling error is called the standard deviation--the plus/minus limits within which one can be confident that the estimate represents the total population on which it is based.

WHAT IS REPLICATION?

In 1971, the National Association of Broadcasters and the Broadcast Rating Council challenged the rating services to study the reliability of their estimates. Arbitron began to examine ways to empirically measure the reliability of its audience estimates. The goal was to provide a technique for more precisely determining the Effective Sample Base (ESB)* for any demographic group within an Arbitron market report. Determining the ESB is a necessary prerequisite for measuring the accuracy of standard error measurement. Working in conjunction with Market Math, Inc., Arbitron found that the best way to determine the reliability of audience estimates was through the replicated sub-samples, or Replication procedure. Arbitron's Replication study, investigated the reliability of audience data in our published market reports. The study took three years and hundreds of thousands of dollars to complete.

THE FINDINGS

Arbitron focused on Cume Ratings and Average Ratings. No new relationships were discovered in the reliability of Cumes. Average Ratings is a different story.

It is universally recognized by statisticians, but largely unknown by media experts, that Average Ratings are more stable than Cume Ratings, from the viewpoint of random sampling error. Why? The Average Rating is actually an average of many Cume Ratings. For instance, the Monday-Friday 6-10AM Average Ratings of a radio station is actually the average of its 80 component quarter-hour Cume Ratings. When numbers are averaged, stability is gained. When Cume Ratings are averaged to get Average Ratings, the Effective Sample Base is increased and the sampling error reduced.

The key conclusions of the Replication Study summarized by Arbitron's statistical consultant, Jerome Greene, of Market Math are as follows:

- (1) Average Ratings are more reliable--i.e., have smaller sampling errors than Cume Ratings.
- (2) The Effective Sample Base of Average Ratings increases, but at a decreasing rate, with the number of specific time periods (i.e., quarter-hours) which are included in the average.
- (3) The increase in Effective Sample Base of Average Weekly Quarter-Hour Ratings is substantial because of the large number of quarter-hours which enter into the average.

* ESB is a computer-calculated number of diaries that would have been needed if the actual diaries had been returned in complete proportion to population estimates by demographics and sampling unit. This means each diary would have had the exact same weight. Since diaries are not returned in this ideal proportion, they are sample balanced and the estimates are averaged in order to arrive at the ESB. This process reduces the margin of sampling error.

HOW DOES IT WORK?

There are two tables (See Addenda, pages 47 and 48) with which one can determine the Standard Error of an estimate:

- Table of Statistical Efficiencies for Calculating Standard Error
- Table of Number of Quarter-Hours in Selected Time Periods (Quarter-Hours in Day-Parts)

The Formula:

The procedure involves seven steps:

- (1) Determine the rating (p) for the station, population group, and day-part in question from the Market Report;
- (2) Subtract the rating (p) from 100% to determine (q), the complement of the rating;
- (3) Determine the survey in-tab sample size (n) for the population group upon which the rating (p) is based.

This is accomplished by multiplying the percentage for the population group under the column "Percent of Unweighted In-Tab Sample" by the total in-tab sample under the column "Total Tabulated Diaries", both of which are shown on page three of each Radio Market Report.

- (4) Determine the number of quarter-hours averaged to calculate the rating (p).

This is accomplished by multiplying the number of quarter-hours in the day-part each day by the number of days in the day-part. (Or see Table 2, page 48)

- (5) Determine the Statistical Efficiency factor (SE) from Table 1, page 47.

Find the population group in question in the left-hand column of the table. Then follow the row of numbers to the right of this column until you reach the column for the number of quarter-hours in the day-part in question.

- (6) Enter the numbers determined above in the formula for the Standard Error:

$$\text{Standard Error of } (p) = 2 \times \frac{\sqrt{pq}}{\text{ESB}} = 2 \times \frac{\sqrt{pq}}{n \times \text{SE}}$$

- (7) Determine the confidence interval for the rating (p). This is accomplished by both subtracting the resulting Standard Error from (p) and adding the same value to (p).

This indicates the plus-minus range within which we can be 95.5% certain that the specific rating in question would fall if we measured the total population from which the sample was drawn.

AN EXAMPLE OF STANDARD ERROR CALCULATION

Market: Your City, U.S.A.

Metro In-Tab	987 diaries
Day-Part	Monday-Friday, 6-10AM
Demographic	Men 35-49
Percent of Unweighted Metro In-Tab that is Men 35-49	9.3
Station A Rating for Men 35-49	5.9

- (1) Market Report rating (p) = 5.9
- (2) (q) = 94.1
 $q = 100.0\% - p = 100.0\% - 5.9 = 94.1$
- (3) In-tab Sample Size (n) = 92
 $n = .093 \times 987 = 91.8 = 92$
- (4) Number of quarter-hours averaged = 80
 6-10AM, Monday-Friday, covers four hours or 16 quarter-hours per day for five days.
 $16 \times 5 = 80$
- (5) Statistical Efficiency (SE) = 3.1
 From the table, the SE value for the Men 35-49 sex/age category and 80 averaged quarter-hours is 3.1.
- (6) Standard Error of (p) =

$$2 \times \sqrt{\frac{pq}{n \times SE}} = 2 \times \sqrt{\frac{5.9 \times 94.1}{92 \times 3.1}} = 2 \times \sqrt{\frac{555.19}{285.20}} =$$

$$2 \times \sqrt{1.947} = 2 \times 1.395 = 2.79 = \underline{2.8}$$

- (7) The 95.5% confidence interval for the rating 5.9 is ± 2.8 , or 3.1 to 8.7.

This indicates that in 95.5% of all cases the true rating for the population of Men 35-49 in the Your City Metro listening to Station A in the day-part Monday-Friday, 6-10AM falls within this range, and the average result will be a 5.9 rating.

Had we calculated the Standard Error of this rating using the conventional "nomograph" procedure, the Standard Error would equal 5.3. The 95.5% confidence interval would thus be 5.9 ± 5.3 , or 0.6 to 11.2. Using the more accurate procedure, the Standard Error and confidence interval are reduced by 47%.

ADDENDA

Table 1

Statistical Efficiencies for Calculating Standard Error

Population Group		Efficiency of Cume Ratings*	Efficiency of Average Ratings Based on Number of Quarter-Hours in Day-Part**				
			20	80	100	160	504
Total Persons	12+	.5	1.2	1.9	2.0	2.1	2.4
Total Adults	18+	.6	1.3	2.0	2.1	2.3	2.6
Total Men	18+	.7	1.4	2.5	2.8	3.2	4.1
Total Women	18+	.7	1.5	2.5	2.7	3.0	3.4
Adults	18-49	.6	1.5	2.6	2.7	3.1	3.6
Men	18-49	.7	1.5	3.0	3.4	4.1	5.5
Women	18-49	.7	1.6	2.9	3.2	3.6	4.3
Adults	35-64	.7	1.4	2.4	2.6	2.9	3.4
Men	35-64	.7	1.4	2.8	3.1	3.7	4.9
Women	35-64	.7	1.6	2.8	3.0	3.4	4.1
Adults	25-49	.7	1.5	2.7	2.9	3.3	3.9
Men	25-49	.7	1.5	3.0	3.4	4.2	5.7
Women	25-49	.7	1.6	3.0	3.2	3.7	4.5
Adults	50+	.8	1.5	2.6	2.7	3.1	3.8
Men	50+	.8	1.4	2.8	3.1	3.8	5.3
Women	50+	.8	1.6	2.8	3.0	3.5	4.2
Adults	35-49	.7	1.5	2.8	3.1	3.6	4.5
Men	35-49	.7	1.5	3.1	3.5	4.3	6.2
Women	35-49	.7	1.6	3.1	3.3	3.9	4.8
Adults	18-34	.6	1.6	3.2	3.5	4.1	5.2
Men	18-34	.7	1.6	3.7	4.2	5.3	7.8
Women	18-34	.7	1.7	3.4	3.7	4.4	5.5
Adults	50-64	.8	1.5	2.7	3.0	3.4	4.3
Men	50-64	.8	1.5	2.9	3.3	4.1	5.9
Women	50-64	.8	1.6	2.9	3.2	3.7	4.6
Teens	12-17	.6	2.0	4.4	4.9	5.9	7.9
Adults	25-34	.7	1.6	3.3	3.7	4.4	5.7
Men	25-34	.7	1.6	3.6	4.2	5.3	8.2
Women	25-34	.7	1.7	3.4	3.8	4.4	4.6
Adults	18-24	.6	1.8	3.9	4.3	5.2	7.0
Men	18-24	.6	1.7	4.3	4.9	6.3	9.9
Women	18-24	.6	1.9	3.9	4.3	5.1	6.6

*Cume Ratings Efficiencies may be used for any number of quarter-hours

**See page 4 8 for number of quarter-hours in day-part for calculating Average Rating Efficiencies

Table 2

Quarter-Hours in Day-part

<u>Day-part</u>	<u>Number of Quarter-Hours</u>
Monday-Sunday 6AM-Midnight	504
Monday-Friday 6-10AM	80
Monday-Friday 10AM-3PM	100
Monday-Friday 3-7PM	80
Monday-Friday 7PM-Midnight	100
Saturday 6-10AM	16
Saturday 10AM-3PM	20
Saturday 3-7PM	16
Saturday 7PM-Midnight	20
Sunday 6-10AM	16
Sunday 10AM-3PM	20
Sunday 3-7PM	16
Sunday 7PM-Midnight	20



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