

IMPACT OF THE MAGNUSON-MOSS WARRANTY ACT  
ON THE READABILITY OF WARRANTIES

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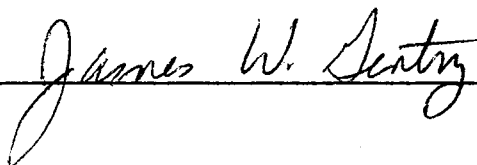
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Scope and Method of Study: The principle objective of this research was the investigation of the impact of the Magnuson-Moss Warranty Act on the improved readability of warranties. The warranties were compared with instruction manuals and sample advertisement copy to discern the level of readability that the manufacturers can attain. Data were collected from a PL/I program, REDLEV, that was written to calculate the Flesch and Fog Readability Indexes. Average comparisons and paired-difference tests were made for pre- and post-Warranty Act warranties, and for warranties and instruction manuals and advertisement copy to determine if the readability of the warranties had improved.

Findings and Conclusions: One purpose of the Warranty Act required that action be taken in changing the language used in warranties to "simple and readily understandable." The results indicate there has been some improvement in readability. Advertisement copy and warranties have similar reading levels, while instruction manuals are easier to read and show a level of readability that business' can attain. The impact of the Magnuson-Moss Warranty Act on the readability of warranties was significant in a relative sense, but the reading levels of the warranties are still difficult.

ADVISER'S APPROVAL

  
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IMPACT OF THE MAGNUSON-MOSS WARRANTY ACT  
ON THE READABILITY OF WARRANTIES

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## CHAPTER I

### THE RESEARCH PROBLEM

#### Introduction

The Chairman, United States Senate Committee on Commerce, Warren G. Magnuson, has written: "A warranty is a complicated legal document whose full essence lies buried in a myriad of reported legal decisions and in complicated state codes of commercial law. The consumers' understanding of what a warranty on a particular product means to him frequently does not coincide with the legal meaning" (Magnuson, 1976).

Consumer product warranties have often been confusing, and have been more or less misleading to the consumer, even when there is not intent to deceive the customer (Clark and Davis, 1975). Few consumers have the needed familiarity with legal terminology to accurately determine the protection, conveyed in the typical statement of warranty. Product warranties have been written that attempt to disavow or limit the manufacturers' implied warranties of fitness, while appearing on the face of the warranty to be further extending protection to the consumer (Clark and Davis, 1975).

The Magnuson-Moss Warranty--Federal Trade Commission Improvement Act of 1975 was passed in an effort to provide some relief to the consumer in making his choice of products. The key provisions of this legislation are those establishing minimum disclosure standards for written consumer product warranties and those defining federal content standards

for those warranties. The Warranty Act required that action be taken changing the wording and contents of existing product warranties to reflect the new provisions regarding information, and that the language used be "simple and readily understandable."

#### Statement of the Problem

This inquiry is an investigation of business' attempts to comply with the requirement to "fully and conspicuously disclose in simple and readily understandable language the terms and conditions of such a warranty." The study will attempt to determine whether this requirement is in fact being met by the warranties now accompanying consumer products.

The determination will be made by subjecting sample warranties; pre-Warranty Act and post-Warranty Act to a computer analysis of the contents. A program, REDLEV, was written in PL/C to accomplish this analysis. A copy of the program is included in Appendix A. This program will classify the sample copy by level of reading difficulty using two different Readability Indexes: the Gunning Fog Index and the Flesch Readability Index.

The warranty reading levels will be compared to reading levels of sample copy from advertisement and instruction manuals that accompany the product. The rationale for this is to give some comparison and proof that the business' can write in "simple and understandable" language.

Warranties from pre-Warranty Act and post-Warranty Act have been gathered and the following categorical scheme has been attained:

#### Manufacturers

1. General Electric - 8 products
2. Frigidaire - 3 products
3. Sears - 2 products

4. Miscellaneous - 14 products

Products

1. Televisions - 5 manufacturers
2. Washers - 4 manufacturers
3. Irons - 2 manufacturers
4. Refrigerators - 2 manufacturers
5. Kitchen Appliances - 5 manufacturers
6. Household Appliances - 6 manufacturers
7. Outdoor Appliances - 2 manufacturers

The purpose of this study is to compare business' warranties from pre-Warranty Act and post-Warranty Act to determine whether the requirements of "simple and readily understandable" warranties have been met. If not, a determination will be made to see if there has been improvement made in the reading level of the warranties. The warranty reading levels will be compared to samples of instruction manuals to show the probable reading level that the business' can attain.

## CHAPTER II

### LITERATURE REVIEW

#### Introduction

The relevant parts of the areas of literature surveyed in this chapter are (1) previous studies made on warranties; (2) consumer legislation, emphasizing the Magnuson-Moss Warranty Act and FTC Improvement Act; and (3) studies made on the impact of the Magnuson-Moss Warranty Act.

#### Past Studies on Warranties

A number of studies by government, business, trade associations, and Congressional committees have analyzed the problems of consumer product warranties. This section briefly reviews some of these prior studies noting the issues of concern for consumers. Many of the recommendations by these groups are incorporated in FTC's implementing rule on warranty disclosures.

#### Presidential Task Force Report

The Task Force's January, 1969 report recommended that industry and trade associations encourage their members to take voluntary action to improve warranties to make "warranties and guarantees say what they mean and mean what they say." Specific recommendations were made to write warranties in clear and simple language and to eliminate implied

warranty disclaimers and unnecessary exclusions and limitations from warranties.

#### National Business Council for Consumer Affairs

The NBCCA 1972 report made nine recommendations for resolving consumer dissatisfaction with warranty practices. Five of the recommendations were with how warranties could be improved by better warranty content:

1. Product warranties should be transferable to subsequent owners during the period of coverage.
2. Manufacturers should provide clear warranty literature for use by sales personnel and by consumers.
3. Written product warranties should be expressed in clear and simple language.
4. Trade associations should establish and coordinate industry-wide programs of warranty simplification and clarity.
5. Unnecessary restrictions on coverage and consumers' warranty rights should be eliminated.

#### Major Appliance Consumer Action Panel

The MACAP study of 1973 reaffirmed the NBCCA recommendations for more readable warranties and full disclosure of warranty information and recommended that warrantors critically evaluate all warranty disclaimers, limitations, and exclusions, keeping only those that are important.

## House Staff Report

The House Staff in 1974, concluded that federal legislation was needed to curtail product warranties which severely or unfairly restricted consumers' rights or remedies.

The review of past studies reveals that these groups were fairly consistent in calling for simplification of warranties, including plain English use; elimination of disclaimers of buyers' legal rights; removal of unnecessary and unenforceable terms, conditions and limitations; and full disclosure of warranty enforcement procedures.

### Magnuson-Moss Warranty Act

The Warranty Act was approved on January 4, 1975, and became effective on July 4, 1975, as Public Law Number 93-637. It attempts to provide some relief to the consumer in choosing products. It provides minimum disclosure standards for written consumer product warranties and defines federal content standards for the warranties. The Warranty Act enhances the ability of the FTC to function as a protector of consumer rights when deceptive warranties and other unfair practices were discovered.

### Purpose of the Warranty Act

The Warranty Act focuses on the regulation of written product warranties and service contracts provided by manufacturers and suppliers. The aim is to make warranties more understandable to the consumer and to ensure that obligations arising under written warranties are enforceable. The Warranty Act is designed to solve warranty problems by:

1. Requiring that the terms and conditions of written warranties on consumer products be clearly and conspicuously stated in simple and readily understood language.
2. Prohibiting the proliferation of classes of warranties on consumer products and requiring that such warranties be either a full or limited warranty with the requirements of a full warranty clearly stated.
3. Safeguards against the disclaimer or modification of the implied warranties of merchantability and fitness on consumer products where a written warranty is given with respect thereto.
4. Providing consumers with access to reasonable and effective remedies where there is a breach of warranty on consumer products.

The associated FTC Rules, which became effective in January 1976, were designed to "improve the adequacy of information available to the consumer, prevent deception, and improve competition in the marketing of consumer products" (Warranty Act, 1975).

#### Provisions

The Warranty Act gives consumers certain rights when they buy products with written warranties. Warranties are not mandatory, but the Warranty Act sets a standard for those that are offered. The Warranty Act defines a written warranty as any affirmation of fact, promise, or undertaking in writing which becomes part of the basis of the bargain between a supplier and purchaser (Wilkes and Jensen, 1975). Therefore, a warranty can be created by point of sale advertising or by other media

advertising if it is in writing.

The Warranty Act defines a consumer as a buyer of any consumer product (for other purposes than resale) or any person to whom the product is transferred during the period within which the warranties are applicable (Wilkes and Jensen, 1975).

The law defines a consumer product as any tangible personal property normally used for personal, family, or household purposes, including personal property which will be attached to real estate. New and used products and service contracts are included. Regulated products must be distributed in interstate commerce or affect trade, traffic, transportation, or commerce (Wilkes and Jensen, 1975).

The FTC Rules exclude products which are purchased solely for commercial or industrial use. The Rules do not specifically cover service contracts.

The Warranty Act provides that the United States Attorney General or the FTC may bring a suit to restrain any person from making a deceptive warranty or from failing to comply with any requirement. The Warranty Act defines a deceptive warranty as a written warranty which:

1. contains an affirmation of fact, false or fraudulent representations, or promises or descriptions which would mislead a reasonably prudent person exercising due care;
2. fails to contain enough information to prevent its terms from being misleading; or
3. uses the terms "guarantee" or "warranty" when other terms thereof limit the breadth and scope of the protection apparently granted so as to deceive a reasonable person (Wilkes and Jensen, 1975).



## FTC

The FTC now has the ability to act more quickly and effectively against deceptive warranties. The Warranty Act has expanded the FTC's consumer protection powers with extended jurisdiction, new rulemaking authority, power to seek injunctions, and self-representation in litigation (Wilkes and Jensen, 1975).

### Disclosure Requirements

Any warrantor offering a written consumer product warranty must disclose the terms and conditions in simple and easily understood language before the sale of the product. The FTC is authorized to determine the manner and form in which the information must be displayed so that the consumer is not misled when the warranty is found in advertising, labeling, point of sale representations, or other writings.

The Warranty Act covers warranties for consumer products costing \$5.00 or more. The FTC rules raised the coverage from \$5.00 to \$15.00. The disclosure rules required that the warrantor must disclose the following items: (1) identity of the warrantor; (2) identity of the party or parties to whom the warranty is extended; (3) a clear description of the products or parts covered; (4) a statement of what the warrantor will do in the case of malfunction, defect, or failure to conform to the written warranty; (5) the time the warranty coverage begins, if different from the purchase date and its duration; (6) a step-by-step procedure which the consumer should follow to obtain performance of warranty obligations; (7) information concerning the availability of any informal dispute settlement mechanism, any limitation on duration of implied warranties; (8) limitations or exclusions concerning

consequential damages; (9) a notice that the consumer has legal rights under the warranty and may have additional legal rights which vary from state to state; and (10) words or phrases which would not mislead a reasonable average consumer (Wilkes and Jensen, 1975).

The FTC rules left a gap between products costing \$5.00 and \$15.00. Written warranties for these products should include the following: name and address of warrantor; a statement of what is warranted, for how long, and in what respect; if unclear, a statement of what is not warranted; a statement of what the warrantor will do--repair, replace, refund; and a statement of what the consumer must do to obtain performance under the warranty (Powell, 1976).

#### Designation of Warranties and Minimum Standards

A significant portion of the law is that written warranties for consumer products costing more than \$10.00 must be designated as either "full" or limited." A full warranty usually covers both parts and labor. If a full warranty is offered, the warrantor (1) at a minimum, must remedy the problem within a reasonable time and without charge; (2) if it cannot remedy the product after a "reasonable" number of attempts, must offer the consumer the choice of a replacement or a refund; (3) may not limit the duration of implied warranties at all; and (4) may not limit consequential damages unless it appears conspicuously on the face of the warranty. Manufacturers may not impose any duty on the consumer other than notification, unless such duty is "reasonable." This requirement may be a hinderance to offering full warranties in some areas until the FTC or the courts offer more guidance on what is "reasonable" (Powell, 1976).

A limited warranty need not meet all four of the requirements but must be clearly labeled as such. The consumer is responsible for getting a defective piece of equipment to and from the repair center. A dealer's extra warranty can provide this service, including packing and shipping one or both ways (Angus, 1977).

#### Impact of the Magnuson-Moss Warranty Act

When the Magnuson-Moss Warranty--Federal Trade Commission Improvement Act went into effect much discussion had taken place on the probable results of this far-reaching law designed to improve product warranties and warranty practices.

#### Study by McDaniel and Rao

A study by McDaniel and Rao (1980) attempted to evaluate the actual effectiveness of this act. A mailed questionnaire was used to gather information from consumers who had purchased major appliances both before and after the law went into effect. This study was developed to determine whether or not the consumer did perceive a favorable difference in warranties after as opposed to before implementation of the Warranty Act. The following hypothesis was constructed and tested:

Consumers who had experience with both warranties do not perceive a favorable difference in the "post-Magnuson-Moss Act warranties" as opposed to the "pre-Magnuson-Moss Act warranties."

The results of the research study found:

1. That 72.3% felt that the "post-Act" warranties were no better than the "pre-Act" warranties in terms of how well they specify what is and is not covered.

2. That 83% felt the length of the warranty period in today's warranties is no better than in the "pre-Act" warranties.
3. That 87.4% felt that what is covered in today's warranties is no better than what was covered in the "pre-Act" warranties.
4. That 84.1% felt that the "post-Act" warranties were no better than the "pre-Act" warranties in terms of specifying what the company will do if a problem develops.
5. That 75.6% felt that the warranties of today are no better than the "pre-Act" warranties in terms of specifying what the buyer should do if a problem develops.

The results of the study cast some doubt as to the effectiveness of the Magnuson-Moss Warranty Act because 91.4% of the respondents who tend to read the warranty before purchase do not believe that the present warranties are any better than the warranties before the act went into effect.

Staff Report of the Bureau of Consumer  
Protection (1980)

This study analyzed 40 consumer product warranties offered before the Magnuson-Moss Warranty Act and FTC warranty rules (1974) and compares them with the same 40 product warranties offered after the Warranty Act and rules went into effect. The warranties were analyzed for changes in designation of "full" or "limited;" coverage as in scope, duration and remedies; readability; length of text; and frequency of certain restrictive provisions.

The major conclusions of the study were:

1. Before the Warranty Act, most warranties were "limited" under

the statute's standards, and only 6 of 40 would have qualified as "full." After the Warranty Act, 17 of the 40 were in fact "full" warranties. Only two companies switched from a "full" to a "limited" warranty.

2. The coverage under the warranties (looking at such aspects as duration, scope, and remedies) is generally at 1974 levels or has increased. More warranties have increased coverage than have reduced coverage.
3. Warranties have become slightly more readable when measured on an accepted index of readability; most warranties fall into the category of "difficult" reading, short of the statute's standard of "simple and readily understandable."
4. Warranty texts are considerably longer, as a result of the disclosures required under the FTC rule and partly due to the increased use of the exclusion of consequential damage remedy.
5. Two important disclaimers, exclusions, and limitations on buyers' rights--identified in previous studies as problems for consumers--are now found in warranties far less frequently than before the Warranty Act. The exclusion of consequential damages is found more frequently after the Warranty Act went into effect.

Study by Shuptrine and Moore (1980)

Shuptrine and Moore (1980) evaluated the impact of the Magnuson-Moss Act by investigating the readability levels of 125 post-Act warranties. Their results indicated that the reading level required to understand the warranty was greater than could be expected from a high

school graduates for 78 percent of the warranties. While the readability of the warranties did vary some across the nine product lines investigated, the levels were excessive (greater than the high school level) for all of the product lines.

In review of the impact studies, there is some question about the effectiveness of the Magnuson-Moss Warranty Act, but some improvement is believed to have been made in the area of readability.

## CHAPTER III

### METHOD AND PROCEDURE

#### Introduction

The information collected for this study were warranties from pre-Warranty Act and post-Warranty Act, instruction manuals that were published with the product, and advertisements by the manufacturers. The warranties were gathered through the use of a letter to the Business Faculty and Staff at OSU asking for warranties (especially pre-Warranty Act warranties) and by going to appliance stores and making copies of the post-Warranty Act warranties that would match the pre-Warranty Act warranties gathered previously from the faculty. The warranties were categorized by manufacturers and products. Figure 1 shows the manufacturer breakdown and Figure 2 shows the product breakdown.

The data collected from the warranties, instruction manuals, and advertisements were Readability Indexes. These data were collected by the computer program REDLEV.

#### Instrumentation

##### Design

The program REDLEV was written in PL/C. The reason in choosing PL/C over any other languages was its ability to handle alphanumeric strings. PL/I was designed to serve both scientific and file processing

General Electric

Mixer

Iron

Electric Knife

Washer

Refrigerator

Can Opener

TV

Clothes Dryer

Frigidaire

Wall Oven

Washer

Refrigerator

Sears

TV

Washer

Miscellaneous

Mr. Coffee

Sony TV

Briggs &amp; Stratton Lawnmower

Toro Trimmer

Clairol Makeup Mirror

Airtemp AC

TI Calculator

Eureka Vacuum

Zenith TV

RCA TV

Wards Washer

Hoover Iron

La-Z-Boy Chair

Caloric Dishwasher

Figure 1. Breakdown of Warranties According to  
Manufacturer



<u>TV</u>	<u>Washer</u>	<u>Iron</u>
Sony	Wards	Hoover
Zenith	GE	GE
RCA	Frigidaire	
GE	Sears	
Sears		
<u>Refrigerator</u>	<u>Kitchen Appliances</u>	<u>Household Appliances</u>
GE	GE Mixer	Clairol Mirror
Frigidaire	Mr. Coffee	Airtemp AC
	Frig. Wall Oven	Calculator TI
	GE Can Opener	Eureka Vacuum
	Caloric Dishwasher	La-Z-Boy Chair
		GE Clothes Dryer
<u>Outdoor Appliances</u>		
Briggs & Stratton Lawnmower		
Toro Trimmer		

Figure 2. Breakdown of Warranties According to Product

applications which includes facilities for processing strings. PL/C is a special dialect of PL/I. The program is presently on cards but can be placed on disk for future use.

Basically the program is written to read an alphanumeric string and look for certain delimiters. Appendix B shows the input instructions for samples with the specific delimiters. Each card holds one string. The program counts the number of asterisks (\*), which stand for the number of syllables. The program counts each blank in the string for the number of words in the string. Each slash (/) stands for the end of a sentence and each dollar sign (\$) stands for a proper noun and both are counted for use in calculation of the indexes. A question mark (?) is used for a continuation of a word from one string to another to facilitate the printing out of the sample. The program counts these delimiters for each string and keeps a running count for the entire sample. These counts are used in the calculation of the readability indexes which will be discussed in a later section.

### Output

The output of REDLEV includes the input sample written out without the delimiters; the total number of words; the total number of syllables; the number of words with three or more syllables; the total number of sentences in the sample; the average number of syllables per word; the average number of words per sentence; the average number of words per sentence when semi-colons are considered as the end of a sentence to separate a thought; the Flesch Index with a description of style and grade level needed to read the sample with understanding; and the Fog Index. An example of the resulting output from the analysis is shown in

## Appendix C.

### Limitations

One limitation of this program is that it will only count words with seven or less syllables. This information is needed in the calculation of the Fog Index. The other limitation of the program is that it will only print a line of output of 15 or less words. These limitations can easily be adjusted if a problem arises.

### Readability

Readability means the ease with which consumers can read a written text. Readability is a valuable measure of warranty content because a more readable text is presumed to enable more consumers to read and to understand the warranty terms. This helps consumers when shopping to evaluate and compare warranty offerings, and helps them again when seeking benefits under the warranty, particularly when a dispute over coverage arises.

Readability scales are statistical tools used to measure complexity of prose. Generally, they serve well for a determination of whether writing is appropriately gauged to its audience. Extensive research has been conducted to discover those characteristics of writing style that are measurable and to evaluate the extent to which each identifiable attribute impacts on reading difficulty.

For practical reasons no single scale can include all dimensions of the readability issue. The present study employs two scales, thereby acknowledging the fallibility and incompleteness of any one index. Selected for use are the Gunning Fog Index and Flesch Readability Index,

which were also used in the study by Shuptrine and Moore (1980). Each of these measures of readability has been widely applied and thoroughly validated.

#### Gunning Fog Index

Gunning Fog Index GFI is based on two factors that Gunning (1962) found in his extensive research to be the principal deterrents to reading ease: (1) inordinately long sentences and (2) the use of a large number of hard multisyllabic words. The scaling procedure is primarily one of randomly selected 100-word passages, determining sentence length, and counting hard words. Hard words are those with three or more syllables but are not proper nouns.

Results of this enumeration process are used to determine a readability index through application of Gunning's regression-derived formula. The formula consists of adding the average number of words per sentence plus the number of hard words per 100 word samples and multiplying that sum by 0.4. This calculation directly generates an index of the grade level of reading difficulty. A GFI score of say 12 can be interpreted to mean that the material should be minimally comprehensible by someone who has completed the eleventh grade. This assumes that reading grade level and attained educational level are coincident.

#### Flesch Readability Index

Flesch (1951) found that reading difficulty is largely a function of the complexity of sentence structure and the use of cumbersome vocabulary. The Flesch formula uses these measures as proxies for less readily measured factors such as conceptual difficulty, logic, format,

organization, and structure (Schmitt and Kanter, 1980). The Flesch Readability Index is developed by analysis of a random selection of 100-word passages. The Flesch analysis is completed by applying a fixed mathematical formula to the data developed in reviewing the written material. The mathematical formula consisted of the average sentence length times 1.015 plus the number of syllables per word times 0.846 that sum times 100. This sum is subtracted from 206.835 to get the Reading Ease Score. Flesch results must be converted to determine a qualitative difficulty level and specific reading grade range. These conversions are shown in Table I.

#### Expected Results

The expected results from the study were that the readability across most product classes on the average will increase because of the Warranty Act. It is also expected that there will not be a dramatic drop from difficult reading to "simple and understandable" reading of the warranties. Samples from instruction manuals and advertisement are expected to show that the manufacturers can write "simple and readable" copy.

#### Analysis of Results

The results from REDLEV will be used for the comparisons. The average of the product readability indexes from pre-Warranty Act warranties of the different manufacturers will be checked to see if they have changed compared to post-Warranty Act warranties. A check will be made for the products to determine whether there has been any improvement across product lines. Then comparisons will be made with instruction

TABLE I  
READABILITY RANGES

Reading Ease Score	Description of Style	Typical Magazine	Syllable Per Word	Average Sentence Length	Grade
90-100	Very Easy	Comics	1.23	8	5
80-90	Easy	Pulp Fiction	1.31	11	6
70-80	Fairly Easy	Slick Fiction	1.39	14	7
60-70	Standard	Reader's Digest, Time	1.47	17	8,9
50-60	Fairly Difficult	Harpers, Atlantic	1.55	21	10-12
30-50	Difficult	Academic	1.67	25	13-16
0-30	Very Difficult	Scien- tific	1.92	29	Graduate

manuals and advertisements to determine the potential level of readability each manufacturer could attain.

A paired-difference t-test will be used to determine if there is a statistical difference in the means. The assumption made for this test is the groups are related. The null hypothesis will be the difference between the groups is zero. The paired-difference test will be used for pre- and post-warranties, for manufacturers and for product groups to check the groups for improvement in readability. A difference test will be made for warranties and instruction manuals, and warranties and advertisement copy to check for a difference in readability.

## CHAPTER IV

### RESULTS AND ANALYSIS

#### Introduction

There were 27 warranties, 17 instruction manual samples, and 16 advertisement copy samples run through the program, REDLEV. The results of these are shown in Appendix D.

#### Warranties

In the analysis of comparing the pre-Warranty Act and the post-Warranty Act warranties for improvement in readability according to the two different indexes, the results from the Flesch Index indicated that 19 out of 27 warranties improved in readability or 70.4% of the warranties were easier to read. The results from the Fog Index indicated that 17 out of 27 warranties improved in readability and one warranty remained the same. The list of products are in Figure 3 with the descriptors of better or worse corresponding to the change in readability.

The overall averages showed that there has been some improvement in the readability of the warranties. The average Flesch Index showed the readability has improved from 28.3 to 36.8 (the higher the number the better the readability). According to the Fog Index, the readability has improved from 25.2 to 22.9 (the lower the number the better the readability). Although the average readability has improved slightly, the average warranty is still "difficult" to read.



	<u>Flesch Index</u>	<u>Fog Index</u>
Airtemp, AC	worse	worse
Sears, TV	better	worse
Briggs & Stratton, Lawnmower	worse	worse
Sears, Washer	worse	better
Wards, Washer	better	better
GE, Can Opener	better	better
GE, Clothes Dryer	better	better
GE, Mixer	better	better
RCA, TV	worse	worse
Toro, Trimmer	better	worse
TI, Calculator	better	same
Eureka, Vacuum	worse	worse
Caloric, Dishwasher	better	better
GE, TV	better	better
Frigidaire, Refrigerator	better	better
Sony, TV	better	better
GE, Iron	worse	worse
La-Z-Boy, Chair	better	better
Frigidaire, Washer	better	better
GE, Knife	better	better
GE, Washer	better	better
Clairol, Mirror	better	worse
Hoover, Iron	worse	better
Zenith, TV	better	better
Frigidaire, Wall Oven	worse	worse
Mr. Coffee	better	better
GE, Refrigerator	better	better

Figure 3. Warranty Results

In the calculation of the paired-difference test between pre- and post-Warranty Act warranties for all warranties gathered, an  $\alpha$  value of 0.01 was chosen because a high degree of accuracy was desired. The null hypothesis was that the difference between the means was zero. The results of this test for the Flesch Index indicated that the null hypothesis could be rejected for an  $\alpha$  value of 0.01. This implies that statistically there has been some improvement in the readability of the warranties. The results of this test for the Fog Index indicated that the null hypothesis could be rejected for an  $\alpha$  value of 0.025. The results of the calculation are shown in Appendix E.

#### Manufacturers

The breakdown of warranties according to manufacturers (General Electric, Frigidaire, and Sears) shows a slight improvement in average readability in all three cases. In the case of General Electric ( $n=8$ ), the average Flesch Index showed an improvement in readability from 24.5 to 36.7 and the average Fog Index showed an improvement in readability from 26.8 to 22.7. In the case of Frigidaire ( $n=3$ ), the average Flesch Index showed an improvement in readability from 17.0 to 23.4 and the average Fog Index showed an improvement in readability from 30.2 to 28.5. In the case of Sears ( $n=2$ ), the average Flesch Index showed an improvement in readability from 51.8 to 53.8 while the average Fog Index showed a decrease in readability from 15.9 to 16.8. The composite results are shown in Figure 4. There is a difference in average readability across manufacturers, but this could be due to the different sample sizes.

In the calculation of the paired-difference test between pre- and

<u>OVERALL AVERAGES</u>			<u>N</u>	<u>POST FLESCH READABILITY RANGE</u>
	<u>Pre</u>	<u>Post</u>		
Flesch	28.3	36.8	27	Difficult
Fog	25.2	22.9		
<u>General Electric</u>				
Flesch	24.5	36.7	8	Difficult
Fog	26.8	22.7		
<u>Frigidaire</u>				
Flesch	17.0	23.4	3	Very Difficult
Fog	30.2	28.5		
<u>Sears</u>				
Flesch	51.8	53.8	2	Fairly Difficult
Fog	15.9	16.8		

Figure 4. Manufacturer Breakdown of Readability Indexes

post-Warranty Act warranties for different manufacturers and for the Flesch and Fog Indexes indicated that General Electric is the only manufacturer whose readability has improved significantly because of the Warranty Act. The average readability indexes showed a statistical improvement from pre- and post-Warranty Act warranties in that the average means were not equal. Sears and Frigidaire have not improved the readability of their warranties. The t-test results indicated no significance at an  $\alpha$  value of 0.1. The small sample sizes no doubt contribute to their lack of significances. The calculations are shown in Appendix E.

#### Products

The analysis of readability according to product breakdown showed mixed results. In the product category of televisions (n=5), the average Flesch Index showed an improvement in readability from 24.0 to 40.9 and the average Fog Index showed an improvement in readability from 26.9 to 22.9. In the category of washers (n=4), the average Flesch Index showed an improvement in readability from 27.4 to 39.9 and the average Fog Index showed an improvement from 26.0 to 21.7. In the category of irons (n=2), the average Flesch Index showed a decrease in readability from 40.1 to 36.3 and the average Fog Index showed a decrease in readability from 20.5 to 21.0. In the product category of refrigerators (n=2), the average Flesch Index showed an improvement in readability from 30.9 to 28.8. The remaining warranties were categorized into kitchen appliances, household appliances, or outdoor appliances. In the product category of kitchen appliances (n=5), the average Flesch Index showed an improvement in readability from 18.9 to 32.9 and the average

Fog Index showed an improvement in readability from 29.3 to 23.8. In the product category of household appliances (n=6), the average Flesch Index showed a slight improvement in readability from 34.1 to 34.9 and the average Fog Index showed a slight decrease in readability from 22.1 to 22.8. In the product category of outdoor appliances (n=2), the average Flesch Index showed a decrease in readability from 45.6 to 43.5 and the average Fog Index showed a decrease in readability from 16.7 to 20.7. Figure 5 shows the results of the above discussion.

The calculation of the paired-difference test between pre- and post-Warranty Act warranties for both Flesch and Fog Indexes and for different product categories indicated that statistically at the .01 level none of the product groups have improved the readability of their warranties. However, the product-group of televisions had a significant improvement in readability at the .05 level and the product-groups washers and kitchen appliances had a significant improvement in readability at the .1 level. For the Fog Index, the product-group washers had a significant improvement in readability at the .1 level. All other product-groups were not significant at the .1 level. Again, note that the sample sizes are quite small in these areas.

The product-groups that showed an improvement in average readability were televisions, washers, refrigerators, kitchen appliances, and household appliances. The product groups that showed a decrease in readability were irons and outdoor appliances.

#### Comparison of Readabilities

Figure 6 shows a comparison of post-Warranty Act warranties, instruction manuals, and advertisement copy. Of the warranties being

	<u>Pre</u>	<u>Post</u>	<u>Sample Size</u>
TELEVISION			
Flesch	24.0	40.9	5
Fog	26.9	22.9	
WASHERS			
Flesch	27.4	39.8	4
Fog	26.0	21.7	
IRONS			
Flesch	40.1	36.3	2
Fog	20.5	21.0	
REFRIGERATORS			
Flesch	20.5	27.7	2
Fog	30.9	28.8	
KITCHEN APPLIANCES			
Flesch	18.9	32.9	5
Fog	29.3	23.8	
HOUSEHOLD APPLIANCES			
Flesch	34.1	34.9	6
Fog	22.1	22.8	
OUTDOOR APPLIANCES			
Flesch	45.6	43.5	2
Fog	16.7	20.7	

Figure 5. Product Breakdown of Readability Indexes

	<u>Warranty</u>		<u>Instruction</u>		<u>Advertisement</u>	
	<u>Flesch</u>	<u>Fog</u>	<u>Flesch</u>	<u>Fog</u>	<u>Flesch</u>	<u>Fog</u>
Frigidaire	23.4	28.5	84.0	3.0	22.4	27.7
Sears	53.8	16.8	44.4	20.0	55.6	16.3
GE	36.2	22.5	52.5	14.9	65.6	10.9
RCA	29.7	27.3	57.7	15.1	48.9	23.9
La-Z-Boy	40.3	20.9	62.2	14.8	57.5	15.0
Zenith	19.0	29.6	72.2	11.4	50.3	20.1
TI	12.5	30.8	65.7	13.4	7.2	26.9
Toro	53.9	16.2	36.6	16.5	34.0	32.0
Eureka	30.4	24.8	77.0	4.3	47.3	21.4
Clairol	59.9	14.3	79.4	9.8	65.0	7.4
Briggs & Stratton	33.1	25.1	56.0	10.2	33.6	21.4
Airtemp	28.3	24.0	47.2	19.0	57.7	13.9
Wards	40.6	20.9	59.6	14.5	46.1	15.5
Hoover	42.2	20.7	56.6	17.0	47.3	22.9
Mr. Coffee	30.7	25.1	54.2	16.5	41.3	11.0

Figure 6. Comparison of Post-Warranty Act Warranties,  
Instruction Manuals and Advertisements

compared in the figure, the average Flesch Index showed the readability as being "difficult." The instruction manuals showed an average Flesch Index readability of 60.8 which according to the Flesch Readability Range is "standard" and the average Fog Index showed a readability of 12.8. The advertisement copy showed an average Flesch Index readability of 45.2 which is "difficult" and the average Fog Index showed a readability of 19.3.

The paired-difference test for comparison of the readability between warranties and instruction manuals for the Flesch and Fog Indexes showed that the null hypothesis should be rejected at the 0.01 level. This indicated that the instruction manuals had a higher readability than the warranties. In the comparison of readability between warranties and advertisement copy for the Flesch and Fog Indexes, the results indicated that there was not a difference in readability at the .01 level but there was a significant difference at the .05 level. This means at the .05 level, advertisements are easier to read than the post-Act warranties. The calculations are shown in Appendix E.

The average results indicated that on the most part the instruction manuals have a higher readability than either the warranties or the advertisement copy. In some cases, as evidenced by Figure 6, the advertisement copy is as hard or harder to read than the warranties.



## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Summary

The principle objective of this research was the investigation of the impact of the Magnuson-Moss Warranty Act on the improved readability of warranties. The warranties were compared with instruction manuals and sample advertisement copy to discern the level of readability that the manufacturers can attain.

The purpose of the Warranty Act required that action be taken changing the wording and content of existing product warranties to reflect the new provisions of the Act regarding information and the language used be "simple and readily understandable." The results showed that statistically there has been some improvement in readability between pre- and post-Warranty Act warranties. Overall, the average readability indexes showed an improvement, but according to the Flesch Readability Range (Table I), the warranties are still "difficult" to read. In the breakdown of warranties according to manufacturers, the average indexes show an improvement in readability but statistically, General Electric is the only manufacturer whose readability improved because of the Warranty Act at the .01 level. In the breakdown of warranties according to product groups, five groups improved in average readability while two groups had a decrease in readability. Statistically, the product-groups television had significant improvement in

readability at the .05 level and washers and kitchen appliances had significant improvement in readability at the 0.1 level. The reason for the lack of more statistical improvement in readability for the product and manufacturer breakdown is the small sample sizes. In the comparison of readability of instruction manuals and advertising copy, the average results indicated that instruction manuals were easier to read than the warranties. The advertisement comparison indicated a surprising result in that the average readability index was just slightly higher. Statistically, there was a difference between warranties and advertisements in readability at the .05 level. Instruction manuals did have a higher readability index than the warranties.

#### Conclusions

The literature indicates that there is some question as to the effectiveness of the Magnuson-Moss Warranty Act (McDaniel and Rao, 1980; Schmitt and Kanter, 1980; Shuptrine and Moore, 1980). The results of this study also question the effectiveness of the Warranty Act in the area of improved readability of warranties.

The results indicated, the requirement of "simple and readily understandable" language of the warranties by the Magnuson-Moss Warranty Act have not been met. The results do indicate some average improvement and some significant improvement in readability at the .01 level. The data imply that some of the manufacturers have attempted to follow the regulations of the Warranty Act and have improved the readability of their warranties while following the other regulations of the Warranty Act.

The data indicate that the manufacturers can write their

instruction manuals at ninth grade reading level according to Flesch Readability Ranges in Table I, their advertisement copy at fourteenth grade reading level, and warranties are written at fifteenth grade reading level.

If ninth grade reading level is "simple and readily understandable," the manufacturers have shown by their instruction manuals they have the potential to write at this level. As evidenced, the impact of the Magnuson-Moss Warranty Act on the readability of warranties is limited.

#### Recommendations for Further Research

Future research on the areas studied should include a larger sample of warranties from a wider range of manufacturers and a broader set of products.

The warranty information sought could be more specific in the area of "full" or "limited" warranties, length of warranties, and coverage of warranties.

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APPENDICES

PL/C NUMBER, ID= 'JOHN C. LEHMAN'

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EDLEV: PROC OPTIONS(MAIN);

PL/C-R7.6-041 02/20/81 18:19

STMT LEVEL NEST BLOCK MLVL SOURCE TEXT

```

1          REDLEV: PROC OPTIONS(MAIN);
           /* THIS PROGRAM WILL TEST READING LEVELS USING THE FLESCH */
           /* INDEX AND THE GUNNING FCG INDEX */
           /* WRITTEN BY JOHN C. LEHMAN */
           /* INPUT INSTRUCTIONS FOR SAMPLES */
           /* START IN COL 1, AFTER EACH WORD PUT * FOR EACH SYLLABLE */
           /* PLACE PUNCTUATION BEFORE THE DELIMITERS AND AFTER THE WORD */
           /* LEAVE ONE BLANK AFTER THE DELIMITERS */
           /* IF A WORD CONTINUES FROM ONE CARD TO ANOTHER PLACE ? IN COL 80 */
           /* STANDS FOR END OF SENTENCE */
           /* AT END OF SAMPLE FILL WITH */
           /* 1 PROPER NOUNS OR COMPUTATIONS OF EASY WITH 3 + SYLLABLES */
           /* N IS THE NUMBER OF CARDS IN THE SAMPLE TO BE TESTED */
           N=17;
           DECLARE WARRANTY(150) CHARACTER VARYING;
           DECLARE WORDS(20) CHARACTER(80) VARYING;
           DECLARE SE CHARACTER VARYING;
           DECLARE SENTENCE(5) CHARACTER(80) VARYING;
           DECLARE SENT(5) CHARACTER(80) VARYING;
           DECLARE ASPW,FINDEX FICAT DECIMAL;
           DECLARE SYLL FIXED DECIMAL;
           /* THE NUMBER FOLLOWING WARRANTY IS THE NUMBER OF CARDS */
           /* TO BE TESTED */
           DECLARE IN,HERE,SENT) FIXED DECIMAL;
           DECLARE (AWPS) FICAT DECIMAL;
           DECLARE GTSYL FIXED DECIMAL;
           DECLARE FCG FICAT DECIMAL;
           DECLARE GTSYLF FIXED DECIMAL;
           DECLARE AMPSS FLOAT DECIMAL;
           DECLARE SCCI FIXED DECIMAL;
           DECLARE GTS FLOAT DECIMAL;
           /* READ IN WARRANTY */
           GTSYL=0;
           SYLL=0;
           SENT=0; WORD=0;
           GTSYLF=0;
           SCCI=0;
           DO J=1 TO N BY 1;
           /* INITIALIZE VARIABLES */
           ABC=C;
           Z=0;
           M=0;
           I=0; K=C;
           L=0;
           Q=0; R=0; S=0; T=0; V=C;
           W=0;
           X=0;

```

QUELV: PRIC OPTIOM(SMAHI);

FL/C-K7.6

SIMT LEVEL NEST BLOCK NLVL SOURCE TEXT

Line	Level	Nest	Block	Nlvl	Source Text
38	1	1	1	1	ZZ=0;
39	1	1	1	1	D=1;
40	1	1	1	1	GET EDIT I WARRANTY(I) (CCL(I), AIBG);
					/* SEARCH FOR SENTENCES */
41	1	1	1	1	DO WHILE (I<LENGTH(WARRANTY(I)));
42	1	2	1	1	I=I+1;
43	1	2	1	1	IF SUBSTR(WARRANTY(I), I, 1)='/'
44	1	2	1	1	THEN SENT=SENT+1;
45	1	2	1	1	END;
46	1	1	1	1	DO WHILE (K<LENGTH(WARRANTY(I)));
47	1	2	1	1	K=K+1;
48	1	2	1	1	IF SUBSTR(WARRANTY(I), K, 1)=' '
49	1	2	1	1	THEN SCCI=SCCI+1;
50	1	2	1	1	END;
					/* SEARCH FOR WORDS */
51	1	1	1	1	DO WHILE (K<LENGTH(WARRANTY(I)));
52	1	2	1	1	K=K+1;
53	1	2	1	1	IF SUBSTR(WARRANTY(I), K, 1)=' '
54	1	2	1	1	THEN WORD=WORD+1;
55	1	2	1	1	END;
					/* COUNT NUMBER OF SYLLABLES */
56	1	1	1	1	DO WHILE (L<LENGTH(WARRANTY(I)));
57	1	2	1	1	L=L+1;
58	1	2	1	1	IF SUBSTR(WARRANTY(I), L, 1)='/'
59	1	2	1	1	THEN SYLL=SYLL+1;
60	1	2	1	1	END;
					/* COUNT NUMBER OF WORDS WITH 3 SYLLABLES */
61	1	1	1	1	DO WHILE (Q<78);
62	1	2	1	1	Q=Q+1;
63	1	2	1	1	IF SUBSTR(WARRANTY(I), Q, 3)='***'
64	1	2	1	1	THEN GTSYL=GTSYL+1;
65	1	2	1	1	END;
					/* COUNT WORDS WITH 4 SYLLABLES */
66	1	1	1	1	DO WHILE (R<77);
67	1	2	1	1	R=R+1;
68	1	2	1	1	IF SUBSTR(WARRANTY(I), R, 4)='****'
69	1	2	1	1	THEN GTSYL=GTSYL+1;
70	1	2	1	1	END;
					/* COUNT WORDS WITH 5 SYLLABLES */
71	1	1	1	1	DO WHILE (S<76);
72	1	2	1	1	S=S+1;
73	1	2	1	1	IF SUBSTR(WARRANTY(I), S, 5)='*****'
74	1	2	1	1	THEN GTSYL=GTSYL+1;
75	1	2	1	1	END;
					/* COUNT WORDS WITH 6 SYLLABLES */
76	1	1	1	1	DO WHILE (T<75);
77	1	2	1	1	T=T+1;
78	1	2	1	1	IF SUBSTR(WARRANTY(I), T, 6)='*****'
79	1	2	1	1	THEN GTSYL=GTSYL+1;
80	1	2	1	1	END;
					/* COUNT WORDS WITH 7 SYLLABLES */
81	1	1	1	1	DO WHILE (V<74);
82	1	2	1	1	V=V+1;
83	1	2	1	1	IF SUBSTR(WARRANTY(I), V, 7)='*****'
84	1	2	1	1	THEN GTSYL=GTSYL+1;



REJLVL: PROC OPTI(ONSIMA)H);

FL/C-17.6-0

STATE LEVEL NEST BLOCK MLVL SOURCE TEXT

LINE	STATE	LEVEL	NEST	BLOCK	MLVL	SOURCE TEXT
85	1	2	1			END;
86	1	1	1			/* COUNT PROPER NOUNS AND EASY THREE SYLLABLE WORDS */
87	1	2	1			DO WHILE (X<LENGTH(WARRANTY(J)));
88	1	2	1			X=X+1;
89	1	2	1			IF SUBSTR(WARRANTY(J),X,1)='S'
90	1	2	1			THEN GTSYLF=GTSYLF+1;
						END;
91	1	1	1			/* WRITE OUT WARRANTY */
92	1	2	1			DO WHILE (Z<LENGTH(WARRANTY(J)));
93	1	2	1			Z=Z+1;
94	1	2	1			IF SUBSTR(WARRANTY(J),Z,1)='S'
95	1	2	1			THEN SLBSTR(WARRANTY(J),Z,1)=' ';
96	1	2	1			END;
97	1	1	1			DO WHILE (M<LENGTH(WARRANTY(J)));
98	1	2	1			M=M+1;
99	1	2	1			IF SUBSTR(WARRANTY(J),M,1)='S'
100	1	2	1			THEN SLBSTR(WARRANTY(J),M,1)=' ';
101	1	2	1			END;
102	1	1	1			DO WHILE (Z<LENGTH(WARRANTY(J)));
103	1	2	1			Z=Z+1;
104	1	2	1			IF SUBSTR(WARRANTY(J),Z,1)='S'
105	1	2	1			THEN SLBSTR(WARRANTY(J),Z,1)=' ';
106	1	2	1			END;
107	1	1	1			DO WHILE (ABG<LENGTH(WARRANTY(J)));
108	1	2	1			ABG=ABG+1;
109	1	2	1			IF SUBSTR(WARRANTY(J),ABG,1)='S'
110	1	2	1			THEN SUBSTR(WARRANTY(J),ABG,1)=' ';
111	1	2	1			END;
112	1	1	1			AA=VERIFY(WARRANTY(J),' ');
113	1	1	1			IF AA=C THEN GO TO QUIT;
114	1	1	1			AA=INDEX(WARRANTY(J),' ');
115	1	1	1			IF AA=C THEN GO TO CL1;
116	1	1	1			WORD\$11=SUBSTR(WARRANTY(J),AA,AA-1);
117	1	1	1			AC=VERIFY(SUBSTR(WARRANTY(J),AB1),' ');
118	1	1	1			IF AC=C THEN GO TO QUIT;
119	1	1	1			AAE=AB1*AC-1;
120	1	1	1			AD=INDEX(SUBSTR(WARRANTY(J),AAE),' ');
121	1	1	1			IF AD=C THEN GO TO QUIT;
122	1	1	1			AAE=AAE*AD-1;
123	1	1	1			WORD\$(2)=SUBSTR(WARRANTY(J),AAE,AD-1);
124	1	1	1			AE=VERIFY(SUBSTR(WARRANTY(J),AAE),' ');
125	1	1	1			IF AE=0 THEN GO TO QUIT;
126	1	1	1			AAE=AAE*AE-1;
127	1	1	1			AF=INDEX(SUBSTR(WARRANTY(J),AAE),' ');
128	1	1	1			IF AF=0 THEN GO TO QUIT;
129	1	1	1			AAE=AAE*AF-1;
130	1	1	1			WORD\$(3)=SUBSTR(WARRANTY(J),AAE,AF-1);
131	1	1	1			AG=VERIFY(SUBSTR(WARRANTY(J),AAE),' ');
132	1	1	1			IF AG=C THEN GO TO CL1;
133	1	1	1			AAI=AAE*AG-1;
134	1	1	1			AH=INDEX(SUBSTR(WARRANTY(J),AAI),' ');
135	1	1	1			IF AH=C THEN GO TO QUIT;
136	1	1	1			AAI=AAI*AH-1;
137	1	1	1			WORD\$(4)=SUBSTR(WARRANTY(J),AAI,AH-1);
138	1	1	1			AI=VERIFY(SUBSTR(WARRANTY(J),AAI),' ');
139	1	1	1			IF AI=C THEN GO TO QUIT;
140	1	1	1			AAJ=AAI*AI-1;
141	1	1	1			WORD\$(5)=SUBSTR(WARRANTY(J),AAJ,AI-1);
142	1	1	1			AI=VERIFY(SUBSTR(WARRANTY(J),AAJ),' ');
143	1	1	1			IF AI=C THEN GO TO QUIT;
144	1	1	1			AAJ=AAJ*AI-1;
145	1	1	1			WORD\$(6)=SUBSTR(WARRANTY(J),AAJ,AI-1);

CELEVE: PRIC.GPTION(MAIN):

STMT LEVEL NEST BLOCK NLVL SOURCE TEXT

```
146 | | | | IF A1=0 THEN GO TO QUIT;
148 | | | | AAK=AAJ*AI-1;
149 | | | | AJ=INDEX(SUBSTR(WARRANTY(J),AAK),' ');
150 | | | | IF AJ=0 THEN GC TC QUIT;
152 | | | | AAL=AAK*AJ-1;
153 | | | | WORDS(1)=SUBSTR(WARRANTY(J),AAK,AJ-1);
154 | | | | AK=VERIFY(SUBSTR(WARRANTY(J),AAL),' ');
155 | | | | IF AK=C THEN GO TO CLIT;
157 | | | | AA= AAL*AK-1;
158 | | | | AL=INDEX(SUBSTR(WARRANTY(J),AA),' ');
159 | | | | IF AL=C THEN GO TO QUIT;
161 | | | | AAN=AA*AL-1;
162 | | | | WORDS(2)=SUBSTR(WARRANTY(J),AAN,AL-1);
163 | | | | AM=VERIFY(SUBSTR(WARRANTY(J),AAN),' ');
164 | | | | IF AM=0 THEN GC TO QUIT;
166 | | | | AAO=AAN*AM-1;
167 | | | | AN=INDEX(SUBSTR(WARRANTY(J),AAO),' ');
168 | | | | IF AN=0 THEN GC TC QUIT;
170 | | | | AAP=AAO*AN-1;
171 | | | | WORDS(7)=SUBSTR(WARRANTY(J),AAC,AN-1);
172 | | | | AO=VERIFY(SUBSTR(WARRANTY(J),AAP),' ');
173 | | | | IF AO=C THEN GO TO QUIT;
175 | | | | AAQ=AA*AO-1;
176 | | | | AP=INDEX(SUBSTR(WARRANTY(J),AAQ),' ');
177 | | | | IF AP=C THEN GO TO QUIT;
179 | | | | AAK=AAQ*AP-1;
180 | | | | WORDS(1)=SUBSTR(WARRANTY(J),AAC,AP-1);
181 | | | | AQ=VERIFY(SUBSTR(WARRANTY(J),AAQ),' ');
182 | | | | IF AQ=0 THEN GC TO QUIT;
184 | | | | AAS=AAR*AO-1;
185 | | | | AR=INDEX(SUBSTR(WARRANTY(J),AAS),' ');
186 | | | | IF AR=0 THEN GC TO QUIT;
188 | | | | AAT=AA*AR-1;
189 | | | | WORDS(9)=SUBSTR(WARRANTY(J),AAS,AR-1);
190 | | | | AS=VERIFY(SUBSTR(WARRANTY(J),AAT),' ');
191 | | | | IF AS=C THEN GO TO QUIT;
193 | | | | AAU=AA*AS-1;
194 | | | | AT=INDEX(SUBSTR(WARRANTY(J),AAU),' ');
195 | | | | IF AT=C THEN GO TO QUIT;
197 | | | | AAV=AA*AT-1;
198 | | | | WORDS(10)=SUBSTR(WARRANTY(J),AAL,AT-1);
199 | | | | AV=VERIFY(SUBSTR(WARRANTY(J),AAV),' ');
200 | | | | IF AV=0 THEN GC TC QUIT;
202 | | | | AAH=AA*AV-1;
203 | | | | AH=INDEX(SUBSTR(WARRANTY(J),AAH),' ');
204 | | | | IF AH=0 THEN GC TO QUIT;
206 | | | | AAX=AA*AH-1;
207 | | | | WORDS(11)=SUBSTR(WARRANTY(J),AAH,AV-1);
208 | | | | AX=VERIFY(SUBSTR(WARRANTY(J),AAX),' ');
209 | | | | IF AX=C THEN GO TO QUIT;
211 | | | | AAY=AA*AX-1;
212 | | | | AY=INDEX(SUBSTR(WARRANTY(J),AAY),' ');
213 | | | | IF AY=C THEN GO TO QUIT;
215 | | | | AAZ=AA*AY-1;
216 | | | | WORDS(12)=SUBSTR(WARRANTY(J),AAY,AX-1);
```



STMT LEVEL NEST BLOCK MLVL SOURCE TEXT

```

275      1      1      1      /* CALCULATE FOG INDEX */
276      1      1      1      GTS= ((GTSYL-GTSYL1/WORD)*100;
                                FOG =0.4*(LWPS+GTS);
                                /* WRITE RESULTS */
277      1      1      1      PUT SKIP(16) LIST('NUMBER OF WORDS IN WARRANTY=' ,WORD);
278      1      1      1      PUT SKIP(2) LIST('NUMBER OF SYLLABLES IN WARRANTY=' ,SYLL);
279      1      1      1      PUT SKIP(2) LIST('WORDS WITH 3 OR MORE SYLLABLES=' ,GTSYL);
280      1      1      1      PUT SKIP(2) LIST('NUMBER OF SENTENCES IN THE WARRANTY=' ,SENT);
281      1      1      1      PUT SKIP(2) LIST('AVERAGE NUMBER OF SYLLABLES PER WORD=' ,ASPW);
282      1      1      1      PUT SKIP(2) LIST('AVERAGE NUMBER OF WORDS PER SENTENCE=' ,AWPS);
283      1      1      1      PUT SKIP(13) LIST('AVERAGE NUMBER OF WORDS PER SENTENCE=' ,AWPS);
284      1      1      1      PUT SKIP(13) LIST('SEMI-COLONS ARE ASSUMED TO SHOW A THOUGHT');
285      1      1      1      PUT SKIP(13) LIST('TITLES ARE CALLED A SENTENCES');
286      1      1      1      PUT SKIP(16) LIST('FLESCH INDEX=' ,FLINDEX);
287      1      1      1      IF FLINDEX<50. THEN DO;
288      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          VERY EASY');
289      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          FIFTH');
290      1      1      1      GO TO NEXT;
291      1      1      1      END;
292      1      1      1      IF FLINDEX>50. THEN DO;
293      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          EASY');
294      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          SIXTH');
295      1      1      1      GO TO NEXT;
296      1      1      1      END;
297      1      1      1      IF FLINDEX>70. THEN DO;
298      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          FAIRLY EASY');
299      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          SEVENTH');
300      1      1      1      GO TO NEXT;
301      1      1      1      END;
302      1      1      1      IF FLINDEX>80. THEN DO;
303      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          STANDARD');
304      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          EIGHTH AND NINTH');
305      1      1      1      GO TO NEXT;
306      1      1      1      END;
307      1      1      1      IF FLINDEX > 90. THEN DO;
308      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          FAIRLY DIFFICULT');
309      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          TENTH THRU TWELFTH');
310      1      1      1      GO TO NEXT;
311      1      1      1      END;
312      1      1      1      IF FLINDEX > 95. THEN DO;
313      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          DIFFICULT');
314      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          THIRTEEN THRU SIXTEEN');
315      1      1      1      GO TO NEXT;
316      1      1      1      END;
317      1      1      1      IF FLINDEX > 99. THEN DO;
318      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          VERY DIFFICULT');
319      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          GRADUATE LEVEL');
320      1      1      1      GO TO NEXT;
321      1      1      1      END;
322      1      1      1      IF FLINDEX > 0.0 THEN DO;
323      1      1      1      PUT SKIP(12) LIST('DESCRIPTION OF STYLE          VERY DIFFICULT');
324      1      1      1      PUT SKIP(2) LIST('GRADE LEVEL          GRADUATE LEVEL');
325      1      1      1      GO TO NEXT;
326      1      1      1      END;
327      1      1      1      NEXT; END;
328      1      1      1      PUT SKIP(16) LIST('FLECH INDEX=' ,FOG);
329      1      1      1      PUT SKIP(2) LIST('APPROXIMATELY THE NUMBER OF YEARS OF SCHOOLING');
330      1      1      1      PUT SKIP(13) LIST('NEEDED TO READ THE ABOVE WITH EASE');
331      1      1      1      END;
332      1      1      1
333      1      1      1

```

CHRS/WARNINGS DETECTED DURING CODE GENERATION:

APPENDIX B

## INPUT OF A SAMPLE

1. Start in column 1 and use the whole card. After each word in the sample place asterisk '\*' for each syllable. Count each syllable the way you pronounce the word. (Numbers should be included.)
2. Place punctuation before the asterisks but after the word, i.e., furthermore, \*\*\*\_.
3. Do not leave any unnecessary blanks in the sample. Leave 1 space after each word. (After astericks and punctuation.)
4. If you run out of space on the card continue where left off in column 1 of the next card. Except in the case of a continuation of a word; put a '?' in column 80 and then continue word on next card.
5. At the end of a sentence place '/', i.e., service.\*\*/-.
6. Place '\$' for words that are proper nouns or combinations of easy words that have 3 or more syllables, i.e., Magnovox\*\*\*\$\_.
7. At the end of a sample fill the remaining columns with '!', i.e., warranty.\*\*\*\_!!!!!!!!!!!!!!!!!!!!!!!!!!!!

## DELIMITERS

!	end of sample
\$	proper nouns or combinations of easy words that have 3 or more syllables
_	blank
/	end of sentence
*	syllable
?	continuation of word

APPENDIX C

WE GUARANTEE THE KEYMORE AUTOMATIC WASHER TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP. WE AGREE, WITHIN ONE YEAR FROM DATE OF SALE, TO MAKE SERVICE ADJUSTMENTS AND TO REPAIR OR REPLACE, AT OUR OPTION, FREE OF CHARGE ANY PARTS OR PARTS OF THIS PRODUCT WHICH PROVE UPON EXAMINATION BY US TO BE DEFECTIVE. THERE WILL BE NO CHARGE MADE FOR THE LABOR OR TIME INVOLVED IN INSTALLING OR ADJUSTING THESE PARTS. PORCELAIN ENAMEL IS A GLASS FUSED TO METAL AND IS SUBJECT TO DAMAGE WHILE IN USE IF NOT PROPERLY CARED FOR. IF, HOWEVER, A DEFECT SHOULD APPEAR IN THE PORCELAIN WITHIN THIRTY DAYS FROM THE DATE OF SALE, SUCH PART WILL BE REPLACED AND INSTALLED FREE OF CHARGE. REPAIR, REPLACEMENT OR ADJUSTMENTS DO NOT APPLY TO ITEMS LISTED UNDER THE NORMAL RESPONSIBILITY OF THE USER ON THE REVERSE SIDE HEREOF. WE ALSO AGREE TO REPLACE ANY DEFECTIVE PARTS CONTAINED IN THE GEAR CASE FOR A PERIOD OF FIVE YEARS FROM DATE OF SALE. AFTER ONE YEAR FROM DATE OF SALE, A SERVICE CHARGE WILL BE MADE FOR THE LABOR NECESSARY TO REPLACE A PART OR PARTS IN THE GEAR CASE. THIS PRODUCT IS INTENDED FOR DOMESTIC USE ONLY, AND THIS GUARANTEE IS VOID IF THE APPLIANCE IS USED COMMERCIALY. WE DO NOT AUTHORIZE ANY PERSON OR REPRESENTATIVE TO MAKE ANY OTHER GUARANTEE OR ASSUME FOR US ANY LIABILITY OTHER THAN THOSE CONTAINED HEREIN. ANY AGREEMENT OUTSIDE OF, OR CONTRADICTORY TO, THE FOREGOING SHALL BE VOID AND OF NO EFFECT. THIS GUARANTEE APPLIES ONLY TO KEYMORE AUTOMATIC WASHERS OWNED AND OPERATED IN THE UNITED STATES OR CANADA.

NUMBER OF WORDS IN WARRANTY=

268

NUMBER OF SYLLABLES IN WARRANTY =

417



WORDS WITH 3 OR MORE SYLLABLES= 75  
 NUMBER OF SENTENCES IN THE WARRANTY = 11  
 AVERAGE NUMBER OF SYLLABLES PER WORD= 1.55597E+00  
 AVERAGE NUMBER OF WORDS PER SENTENCE = 2.43636E+01  
 AVERAGE NUMBER OF WORDS PER SENTENCE= 2.2333E+01  
 SEMI-COLONS ARE ASSUMED TO SHOW A THOUGHT  
 THIS ARE CALLED A SENTENCES

FLESCH INDEX= 5.04708E+01  
 DESCRIPTION OF STYLE FAIRLY DIFFICULT  
 GRADE LEVEL TENTH THRU TWELFTH

FIG INDEX= 1.9556E+01  
 ROUNGILY THE NUMBER OF YEARS OF SCHOOLING  
 NEEDED TO READ THE ABOVE WITH EASE

END STMT 333 PROGRAM RETURNS FROM MAIN PROCEDURE.

APPENDIX D

## Warranty Results From REDLEV

	Pre		Post	
	<u>Flesch</u>	<u>Fog</u>	<u>Flesch</u>	<u>Fog</u>
Airtemp, AC	34.2	20.9	28.3	24.0
Sears, TV	53.1	12.2	60.7	16.0
Briggs & Stratton, Lawnmower	40.0	19.9	33.1	25.1
Sears, Washer	50.5	19.6	46.9	17.6
Wards, Washer	32.4	21.3	40.6	20.9
GE, Can Opener	26.2	26.8	32.6	21.8
GE, Clothes Dryer	25.9	25.4	38.1	22.1
GE, Mixer	26.2	26.8	37.1	21.3
RCA, TV	35.1	21.6	29.7	27.3
Toro Trimmer	51.2	13.5	53.9	16.2
TI Calculator	10.4	30.8	12.5	30.8
Eureka, Vacuum	38.6	21.3	30.4	24.8
Caloric, Dishwasher	11.6	33.6	45.0	21.1
GE, TV	14.0	32.1	38.7	24.1
Frigidaire, Refrigerator	14.5	34.0	15.0	33.3
Sony, TV	17.9	29.3	37.9	21.3
GE, Iron	34.6	20.2	30.4	21.2
Mr. Coffee	1.5	37.3	30.7	25.1
La-Z-Boy Chair	38.9	21.3	40.3	20.9
Frigidaire, Washer	7.6	34.7	36.2	22.7
GE, Knife	24.0	27.0	40.9	21.5
GE, Washer	18.9	28.5	35.3	25.5
Clairol, Mirror	56.6	12.9	59.9	14.3
Hoover, Iron	45.6	20.8	42.2	20.7
Zenith, TV	0.0	39.3	37.7	25.9
Frigidaire, Wall Oven	29.0	22.0	19.0	29.6
GE, Refrigerator	26.4	27.7	40.3	24.2

## Advertisement Results From REDLEV

	<u>Flesch</u>	<u>Fog</u>
Sears	55.6	16.3
GE	65.6	10.9
RCA	48.9	23.9
La-Z-Boy	57.5	15.0
Sony	40.0	22.9
Frigidaire	22.4	27.7
Zenith	50.3	20.1
TI	7.2	26.9
Toro	34.0	32.0
Eureka	47.3	21.4
Clairol	65.0	7.4
Briggs & Stratton	33.6	21.4
Airtemp	57.7	13.9
Wards	56.1	15.5
Hoover	47.3	22.9
Mr. Coffee	41.3	11.0

## Instruction Manual Results From REDLEV

	<u>Flesch</u>	<u>Fog</u>
Eureka	77.0	4.3
Mr. Coffee	54.2	16.5
Frigidaire	84.0	3.0
RCA	57.7	15.1
Caloric	57.0	14.4
Zenith	72.2	11.4
TI	65.7	13.4
Briggs & Stratton	56.0	10.2
Clairol	79.4	9.8
La-Z-Boy	62.2	14.8
Wards	59.6	14.5
Toro	36.6	16.5
Sears	44.4	20.0
Hoover	56.6	17.0
GE	52.5	14.9
Airtemp	47.2	19.0
Sony	65.9	10.3

APPENDIX E

Paired-Difference Test

Test	df	Flesch				Fog			
		$\bar{d}$	Sd	$t_{calc}$	Significance	$\bar{d}$	Sd	$t_{calc}$	Significance
Warranties Pre-Post	26	-8.5	14.8	-3.2	$p < .01$	2.3	5.7	2.1	$p < .025$
Manufacturer Pre-Post									
General Electric	7	-12.2	8.5	-4.1	$p < .01$	4.1	2.6	4.5	$p < .01$
Frigidaire	2	-6.4	20.0	-8.5	$p > .1$	1.7	9.8	.3	$p > .1$
Sears	1	-2.0	7.9	-0.3	$p > .1$	2.9	1.3	3.7	$p > .1$
Products Pre-Post									
Televisions	4	-16.9	16.5	-2.3	$.025 < p < .05$	4.0	8.3	1.1	$p > .1$
Washers	3	-12.4	13.6	-1.8	$.05 < p < .1$	4.4	5.2	1.7	$.05 < p < .1$
Iron	1	3.8	.6	9.0	$p > .1$	.6	.6	1.4	$p > .1$
Refrigerators	1	-7.2	9.5	-1.1	$p > .1$	2.1	2.0	1.5	$p > .1$
Kitchen Appliances	4	-14.0	17.7	-1.8	$.05 < p < .1$	5.5	8.2	1.5	$.05 < p < .1$
Household Appliances	5	-.8	7.3	-.3	$p > .1$	-.7	2.5	-.7	$p > .1$
Outdoor Appliances	1	2.1	6.8	.4	$p > .1$	-4.0	1.8	-3.1	$p > .1$
Warranties-Instruction Manuals	16	23.1	19.4	4.9	$p < .01$	9.5	7.2	5.4	$p < .01$
Warranties-ADS	15	-8.0	12.7	-2.5	$.01 < p < .025$	3.5	6.8	2.1	$.025 < p < .05$

VITA

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